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THE NATURE AND DIRECTION OF LEARNING

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BY

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IN
MEMORIAM

O. E. S.

PREFACE

Because understanding of the purpose and construction of a volume is essential to its best use, and because prefaces are not always read carefully, much material ordinarily found in a preface will in this volume be found in the opening pages. The introductory pages, addressed to both instructor and students, include a discussion of the derivation and organization of material, some suggested teaching devices, and a statement of the general use of the book in teacher training. This preface will therefore be confined to certain acknowledgments.

Careful readers will discern before proceeding very far into the book that the theory of method presented is an eclectic one. Effort has been made to utilize the best of various views and to avoid extremes of emphasis. Indebtedness to various theories and schools of thought drawn upon is easily discerned. Indebtedness to individuals is not so easily discerned, and the author takes pleasure in making the following acknowledgments.

One of three influences reflected in the theory of learning and teaching advanced is obviously that of Herbartianism, or perhaps what might legitimately be called, "neo-Herbartianism," since the original principles of Herbart have long since been liberalized. For the good in this view the author is indebted to Prof. Thomas H. Gentle of the University of Oregon; Dr. Frank McMurry of Teachers College, Columbia University; the late Prof. S. C. Parker of the University of Chicago; and more recently to Dr. H. C. Morrison, also of the University of Chicago.

The second equally important influence is one which might be called the functional point of view, and the author is indebted for it to Dr. John Dewey, Dr. W. H. Kilpatrick, and to Dr. Frank McMurry, all of Teachers College, Columbia University. This view may be said to emphasize pupil purpose and direction, in contrast to the Herbartian emphasis on teacher purpose and direction. Every effort has been made to maintain a practical balance between these two ideas, each of which has much to contribute, and each of which is dangerous when carried to extremes.

The third emphasis to be noted is that upon utilizing, whenever available, either statistically or experimentally derived data in the support of principles advanced. There is little enough experimental data in the field, but such as there is has been utilized. In the absence of such data, statements rest on psychological theory as set forth by competent psychologists. For this point of view, the writer is indebted to Dr. C. H. Judd and Dr. F. N. Freeman of the University of Chicago, and to Dr. E. L. Thorndike of Teachers College.

The author has studied under each of the men named above, and has been fortunate enough to be associated as a colleague with many of them.

Acknowledgment is also made of the valuable assistance rendered by those who tried out the preliminary mimeographed material with college classes, making critical suggestions based on their experience. Included in this group are Messrs. W. L. Beauchamp, A. J. Brumbaugh, R. L. C. Butsch, and Luther Gilbert, all of the University of Chicago. Finally, acknowledgment is to be made of the invaluable assistance and encouragement given by Dean W. S. Gray, College of Education, University of Chicago, who has been in close and intimate touch with the reorganized courses out of which this volume grew.

W. H. B.

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THE NATURE AND DIRECTION OF LEARNING

TO INSTRUCTORS AND STUDENTS

It is urgently requested that instructors and students using this volume read this statement before attacking the problems in the book.

This volume is the outcome of many years of teaching such courses as *Methods of Teaching* (on both elementary and high-school level), *Principles of Teaching, The Psychology of Learning,* and *The Learning Process,* and of wide experience in supervising student practice teaching, and supervising classroom teaching. It is an effort to present a coherent, unified view of the learning process, including at the same time all the subsidiary pupil activities involved in learning, relating to all this the teacher activities involved in stimulating and guiding learning. Furthermore, the material is so organized as to indicate a number of legitimate methods of handling the book with either normal-school or college classes.

After a number of years of critical manipulation, the content and method of this volume were submitted to three years' intensive critical and experimental attack at the University of Chicago. In the first place, material and method of teaching were carefully organized. Each week a faculty committee met to discuss the work of the past week and to examine what was proposed for the following week. The experiment was explained to the students in advanced sections, and they were invited to comment critically upon the lectures, text, and outside readings, class discussions, quizzes, examinations, etc. The instructor

tried differing methods and materials on the same section, on parallel sections, and on successive classes, inviting comment from faculty committee and advanced students. Other instructors tried the author's methods and evolved their own variations. A stenographic record was made of the entire course as it was taught the last three times it was given. The adaptation, or lack of adaptation, of lectures, readings, or demonstrations was clearly shown by the record of students' answers, questions, and their free class discussion. Thus excellent evidence was obtained on the value of specific pieces of material, methods, questions, tests, etc.

The results were two: (1) a continuous refinement of the *organization* of the material, elaboration of discussion here, elimination of material there, as student reaction and critical try-out indicated; (2) the development of a *method of teaching* by which normal-school and college classes of prospective teachers could be introduced to the problems of directing learning.

The organization of the material. The nature of the learning process was selected as the core around which to unify factors relating to learning and teaching. Once the nature of learning is explained, the various phases or types of learning are presented in concrete detail. Teacher and pupil activities that are related to a given type are introduced and explained in their proper relation. This is followed by a summary of subsidiary learning activities utilized by the pupil. Finally, the teacher's general activities in planning and directing the pupil's learning processes are presented in detail. This gives five fundamental units around which the activities of teaching are organized. The following skeletonized table of contents will show at a glance the general scheme.

Unit I. The Nature of Learning and of Teaching

PROBLEM

1. What is the nature of learning?
2. May learning be correctly defined in more than one way?
3. What are the common misconceptions regarding the nature of learning?
4. What is the nature of teaching?

Unit II. General Factors Affecting Any Type of Learning

1. Is learning wholly active, wholly passive, or partially both?
2. How may educative self-activity be initiated and maintained?
3. How will the learner's past experience and activity affect his present learning?
4. Does the learner acquire only what the teacher aims to teach?
5. How will differences among the learners affect learning?
6. What is the effect of age on the ability to learn?
7. Are there other terminologies for presenting the material covered in this unit?

Unit III. The Learning Types and Their Direction

1. How are motor skills acquired?
2. How are clear-cut ideas (percepts) acquired?
3. How may memorization be facilitated?
4. How may problem-solving skills be acquired?

4A. Is there any value in the Herbartian formal steps?

4B. What is the project method?

5. How are desirable emotional responses developed and acquired?
6. Are variable statements of learning types legitimate?

Unit IV. The Pupil's Subsidiary Learning Activities

1. How may effective, economical drill be secured?
2. How may effective study habits be developed?
3. How may the laboratory be used most efficiently?
4. How may books be used to best advantage?
5. How may organization and expression of thought be used in general learning?

Unit V. The Teacher's General Activities

1. What are the characteristics of a good assignment?
2. How may a good questioning technique be developed?
3. How may the outcomes of learning be examined and tested?
4. What principles should control the construction and operation of an adequate grading system?
5. How may diagnostic procedures be used in improving teaching?
6. How may teaching procedures be most effectively planned?

The validity of the selection and organization of material. The long continued critical evaluation, experimental try-out, and student reaction enabled the author to meet, it is hoped, four important criteria for the selection and organization of material. *First,* the subject matter is based upon and fitted to the level of information possessed by ordinary normal-school and college classes. The method of teaching suggested aims to discover and utilize the background of any given class. Variations are suggested to meet different levels and type of background. *Second,* the subject matter, text illustrations, and questions are of a nature that will appeal to the normal interests of students. The method arouses and utilizes the innate and acquired interests of the learners. *Third,* both subject matter and method are adjusted to what is thought to be a satisfactory level of difficulty. The work is designed to be difficult enough to challenge without being so difficult as to discourage, and at the same time not so easy as to be boresome. *Fourth,* the material and method have been selected to provide for development of the desired outcomes in responses of understanding, appreciation, ability to do, intellectual interests, methods of study and attack, which are valuable to the prospective teacher.

The method of teaching. The method of teaching advocated and made possible by the organization of the volume is a modification of the unit plan of presentation. The problems within each unit are organized as follows:

1. Foreword and set of exploratory or pre-test questions.
2. Assimilative material (the text itself, parallel readings if desired, practical exercises, demonstrations, excursions, etc.).

This material is attacked by appropriate learning activities, reading, study, practice, discussion, outlining, reflecting, written organization of thought, etc.

3. Supplementary assignments. When necessary, supplementary assignments are indicated for possible use with some classes.

These are *additional* lessons and are not *parallel* readings as indicated in (2) above.

4. Summary and test questions, exercises, written reactions, etc.

The discussion upon the exploratory questions will indicate to the instructor how much study of text and parallel readings is probably necessary. It also prepares the student for what is to come by recalling related old knowledge, arousing interest, and raising questions that can be solved only by further study. The experimental try-out indicated that on many topics even advanced students were quite without information and should be immediately assigned to text materials in order that they might acquire facts upon which to base understandings. On the other hand, even average classes were found to have sufficient information on some topics to be able, through directed discussion, to evolve and acquire the desired ideas, understandings, and attitudes. Sometimes the preliminary discussion may take ten minutes at the close of a period, or it may take a whole period, and sometimes two or three periods.

The preliminary discussion is to be followed by study of text material. Occasionally, when the text presentation is brief because the material is supposedly familiar in part to average classes, special supplementary assignments are indicated which the instructor may use if he has classes that need further study. Sometimes material can more easily be supplied through brief lectures than in any other way. Observations, excursions, and discussion should be utilized freely when necessary. Students in the experimental classes freely criticized the procedure that is common in many college classes, namely, tedious reading and laborious quiz-recitations on easy fact material. On many occasions they asked permission to omit class discussion of routine arbitrary facts, offering to acquire them independently and, if necessary, pass a written fact quiz later,

thus saving time for more interesting and profitable class discussion. Based upon experimental try-out and student reaction, the organization is such that lectures, outside preparation of easy material, fact quizzes, etc., are indicated where they are believed to be necessary. The conclusion of each problem consists in lists of questions, exercises to perform, demonstrations, and excursions to be made.

The foregoing detailed instructions are not presented as dogmatic, final, or perfect. They represent one method of teaching the material. Instructors may follow it closely or may go to the opposite extreme and handle the book in the most traditional textbook-teaching manner. The presentation is purposely made as complete and sequential as possible so that it may be used with total disregard of all teaching questions and suggestions in the volume. Most instructors will doubtless wish to do what the author did, that is, modify and adapt such methods as he found to suit his own ideas, temperament, class, and material conditions. In fact, variations of suggestions included will have to be made as the book is used on different levels from normal school to college.

The outcomes of the course. As teacher training must be carried on at present, there must be much *discussion about how to teach* in advance of *practice in teaching*. The outcomes of the various preliminary courses should be not merely the memorization of masses of information about teaching and learning but the acquisition of real understandings about these things which should actually function when the student finds himself before a class. A genuine and aggressive interest in the problems of classroom instruction should be aroused. Genuine appreciation should be developed of the difficulty of teaching and of the need for careful preparation, and for real ability. Through solving the problems in the course itself the student should acquire habits and skills in thinking, analyzing and attack-

ing problems, and planning his work that are not only useful at the time but also likely to stand him in stead when he comes to teach. These understandings, attitudes, and skills will be carried further in special-methods courses for which this course should be a definite preparation.

For each unit in this volume there are a few basic understandings and appreciations. In working each set of exercises the student should acquire and improve certain habits and skills. The instructor should *without fail* determine in his own mind before teaching a unit just what outcomes he is seeking to accomplish, just what understandings will be derived by his class, just what attitudes or skills will be developed. These should be written out in carefully organized form. The presence or absence in the instructor's mind of the real objectives of the unit will vitally condition his success in teaching the material. One of the best tests for each unit is to ask the students to write out in a very brief paragraph or in a limited number of sentences what they feel to be the outcomes of the work in terms of their own gain in understanding, attitude, or skill.

Place of this volume in teacher training. Presenting as it does the psychology of learning and given teaching techniques based thereon, this volume presumably will be used just before courses in special method and practice teaching. In traditional terminology it is a "general-methods" book. It must of necessity be preceded by introductory courses giving the student a general understanding of the school system in which he will work, the materials of instruction, and the organization, management, and testing of the pupil population. It is planned to prepare in the near future one or two other volumes to be the bases of one or two general introductory courses, which are to precede the present volume, which is intended to supply the groundwork of the final general course. Together, the volumes will, it is hoped, provide a sequential, coherent,

and integrated introduction to teaching. The student should then be ready for the detailed treatments of special method and the practical problems of practice teaching.

Parallel Reading

Instructors who wish further discussion of the method of teaching advocated before attempting this volume will be repaid by a study of the following references.

1. Kelty, Mary G., *Teaching American History in the Middle Grades of the Elementary School* (Ginn & Co., 1928). Specific illustrations of the general theory.
2. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926). Chs. vi, xiv, xv, xvi, xvii. Basic discussion of general theory.
3. Pieper, C. J., and Beauchamp, W. L., *Teachers Guidebook for Everyday Problems in Science* (Scott, Foresman & Co., 1927). Part I, pp. 1-31. Excellent discussion of general theory.
4. ———, *Everyday Problems in Science* (Scott, Foresman & Co., 1925). Illustration of actual course worked out on unit basis.
5. Waples, Douglas, and Stone, C. H., *The Teaching Unit: a Type Study* (D. Appleton & Co., 1929). Detailed discussion of a specific unit in mathematics.

UNIT I

THE NATURE OF LEARNING AND OF TEACHING

Upon reading the title of this unit you will doubtless have in succession two attitudes toward it. First, you will feel that of course you know what learning and teaching are. They are what you do in school. They are studying books, asking and answering questions, reciting, taking examinations, etc. But if you keep on thinking, you will begin to see that none of these are learning or teaching, though all of them are involved in the process. Just what is *learning?* What happens when you learn? How do you get people to learn? Your second attitude will probably be that you do not know very exactly what learning is, or that you know what it is, but cannot define it.

Both attitudes are correct. You do know a good deal about learning and teaching in a common-sense way, but you will find difficulty in stating what you know in a definite and organized way. You will be surprised to discover how much of your everyday observation and information will be of use in building up a correct organized understanding of learning and teaching. The following exploratory questions will gather up your present common-sense information, start organizing it coherently, and raise questions that will require further study to settle.

PROBLEM 1

WHAT IS THE NATURE OF LEARNING?

Exploratory and Pre-Test Questions

1. Ask a number of people to tell you what they think *learning* is. Explain that you do not mean *learning* in the sense of *wisdom,* but more specifically: (*a*) what are the several general outcomes of learning, and (*b*) what is the process of learning; that is, what goes on when one *learns,* and what is the result? Collect a number of opinions from various people. (Do not ask teachers.)

2. Have you ever noticed how you go about learning a lesson? What do you do with the assignments given you by instructors—for instance, in laboratory science, in content subjects, in music, in mechanical drawing?

a. Select a given type of learning, and prepare a brief description of what you do in studying (learning). Set down just what you actually do.

b. On the basis of what you do in studying, and what your instructor accepts, just what is learning?

3. Do you think you learned anything through your work on the foregoing question?

a. If so, what was it?

b. If not, what value, if any, is there in the question?

4. If you stick strictly to the facts, the chances are that the definition of learning you advanced in answer to Question 2 is wrong. Ponder this statement carefully in the light of the following:

a. Why do you suppose the author makes this statement about your definition of learning?

b. If the commonly accepted definition of learning is incorrect, you will have to search further. Try to make up a definition of learning reduced to lowest terms—the simplest all-inclusive definition.

(A complete and correct answer is not expected here. However, this is one of the most important queries in the list and a good test

of your ability to analyze. Do not pass it up with superficial attention. The next question may help you.)

5. Consider the case of some one you know who has been markedly affected by education—who has learned a lot—whether the education was a formal classroom affair or not. For instance, consider the change two years produces in a raw freshman; in a self-made man earnestly trying to better himself; in a workman studying for a better position. Reduced to one all-inclusive statement: In what does learning consist in these cases? What are the evidences of learning?

6. What kinds of learning can you list? (You have doubtless discovered several kinds of learning in trying to discover one all-inclusive definition. Do not list any of the myriad specific things which can be learned; try to find major classes under which these specifics can be classified. If it is of help, distinguish between learning as process and learning as product. We are chiefly concerned with learning as process.)

7. What is *teaching?* (A brief general statement in terms of your ideas of its relation to learning will be sufficient.)

8. Is learning always an intentional affair? That is, do we ever learn anything without being aware of it and without intending to do so?

9. Is learning active or passive: wholly or partially either one depending on material and circumstances? Defend your answer.

10. The two foregoing questions are introductory to a line of thought you should pursue for yourself and one that will reappear in the course. What factors (of any nature whatever) encourage or assist the pupil in learning? Interfere with or destroy his learning process? Be very specific. Recall and examine your own experience as a guide.

11. Which of the factors listed in answering Question 10 are directly and intimately concerned with the learning process? Which are more remote?

12. On the basis of your present limited knowledge write out an organized list of problems that will have to be considered before we can complete an answer to the major problem implied in the title to this book, "How to Direct the Pupil's Learning Process." Review your own school experience and particularly your own thinking on the above questions. Preserve your papers

after they are returned by the instructor for they will be used in examining you at the end of the course.

NOTE: Do not consult books or teachers in preparing answers to exploratory or pre-test questions. Discussion with other students, however, is urged. Assistance from outside will short-circuit your thinking, which will be easily recognized in class discussion. You are *not expected* to get *complete and correct* answers here. What counts is *your own present* information on the problems raised. Try to develop and organize all you know.

An illustration of learning. During the weeks that part of this book on the direction of the learning process was being written I observed with great interest an actual case in real life of the direction of learning. The coach and members of a country high-school baseball team were engaged in teaching a certain large and powerful farm boy how to bat. His strength enabled him to knock the ball great distances when he did hit it, and he would have been a decided asset to the team except for the fact that he seldom hit the ball. In addition to being a trifle afraid, he had never played much and did not know how to hold and swing his bat, or how to stand up to the plate. He shut his eyes to swing, and his stroke, though powerful, was wobbly and inaccurate. In baseball parlance, he "stepped in the bucket," that is, stepped far back from the plate with his left foot as he swung. He was thus out of position when striking, could not use his strength, and usually drove the ball into foul territory back of third base. He did, however, desire earnestly to learn how to do it correctly. The faithfulness and persistence of his efforts to learn were equaled only by the consistency of his mates' efforts to teach him.

Both coach and players demonstrated how to hold the bat and how to stand. They taped the bat handle so the proper hold was outlined for the learner, they gave verbal directions in which instruction, pleading, and ridicule all appeared. Day after day boys took turns pitching to him.

Bats and marbles were laid on the ground where he thrust his left foot when out of position so that he slipped and fell when making this error. He was placed against a fence so that he could not step back. Small boys yelled at him when he closed his eyes to swing. The various "teachers" were direct and merciless in their methods, but through it all the spirit was a kindly one. It was "all for the good of the team." Both coach and fellow players commended heartily approaches to correct form and evidences of conquered fear. As spring and early summer wore on, the boy acquired more and more ability. He stood up to the plate, kept his eyes on the ball, got his body into the swing. He developed a "good eye," hitting the ball with more and more regularity. He learned to bat.

For the moment we may disregard all details in this complex illustration of learning in process and focus on the fact that from it we can extract a definition of learning in its simplest and most direct terms. Learning is the acquisition of new responses or the modification of old ones. Learning is indicated by a change in the behavior or conduct of the learner.

Is this an acceptable definition of learning? The definition just given obviously fits the illustration on which it is based. The learning did consist in the acquisition of a response, a mode of action, or behavior. But questions are sure to arise in the minds of traditional teachers and in the thinking of untrained beginning students. Is all learning a matter of behavior or response? Where is the "response" resulting from studying of the voyage of the *Mayflower?* From a study of the geography of Japan? From study of the Missouri Compromise or the Emancipation Proclamation? Here we seem to be dealing with facts, ideas, and information. Little or no connection with behavior responses can be seen. What responses valuable to real life are acquired from a study of Tennyson's *Idylls*

of the King? From a study of *Silas Marner?* What effect can there be on daily life from studying the heroic deeds of long-dead warriors, Richard the Lion Heart, King Arthur, or Napoleon? What results are obtained from studying the story of Nathan Hale and of Washington at Valley Forge? Here we seem to be dealing with enjoyable, æsthetic, idealistic, or ornamental things. What responses in daily life are affected?

Are there not other kinds of learning than that defined as a change in behavior, as a response? At this point we may introduce a modification of the terms *response, reaction,* and *behavior.* The illustration that opens this discussion focuses attention on the outward or motor response. In ordinary usage, also, response, reaction, and behavior are usually thought of as outward, overt, motor, in nature. But to "stop and think" is itself a response, an activity, a piece of behavior. To learn to think is a true learning result in and for itself. In fact, it is one of the highest forms of activity or response, one of the most desirable learning results. The inhibiting or delaying of overt action by means of mental activity is one of the distinctive marks of the educated as contrasted with the uneducated individual, of the bright as contrasted with the dull. The development of the mental skills involved in reflective thought and problem solving is a legitimate concern of the learner because reflective thought is itself a highly important and desired type of activity.

There are still other types of learned response besides those of motor skill and reflective thought. Often one is confronted with situations in life that demand for solution the recall of an arbitrary association, a logical formula, a series of related ideas. To be able to supply the correct price of an article, the right route to a certain place, the correct answer to simple arithmetical combinations, depends upon learned (memorized) response.

Situations arise demanding ready and accurate recognition of words heard, things seen, odors, tastes, etc. To be able to respond quickly requires a store of clear-cut specific ideas or percepts of things, persons, symbols, etc. Equally necessary are general ideas or concepts. The acquisition of these ideas is a legitimate object of learning.

Finally, one may respond with enjoyment or appreciation, both of which are emotional reactions. We may enjoy a picture, a play, the beauties of nature. To be able to enjoy one's self properly—to respond thus to situations is a desirable outcome of learning. Another phase of emotional response is seen when one responds with actions based upon attitudes of loyalty, idealism, etc. Right attitudes toward conduct and standards of actions are legitimate outcomes of learning.

Even the beginning student can see that these types of learned response are intimately related one to another. Correct motor response often depends upon clear-cut ideas of what to do, upon reflective choice between methods. Reflective thought in turn depends among other things upon clear ideas accurately remembered. One's outward responses depend still again upon one's emotional standards, ideals, and attitudes.

As to process, one type of learning may and usually does predominate in any given situation, with the others usually present in minor rôles. We may return to our illustration to see if further analysis will reveal the interrelation of the types of learning.

The various activities within a complete learning act. *The place of ideas, facts, information.* The boy learning to bat *knew* that he did not know how to do it. His mates told him so, and his performance corroborated the statement. That is, he had, speaking colloquially, *ideas* or *beliefs* in his mind about the matter. Furthermore, he was building up other *ideas*—those which would

enable him to improve his performance. Again his mates assisted him by demonstration, by verbal directions, by criticism, to build up in his mind a *clear idea* of what was to be done and how to do it. In some cases he was given reasons why he must act in certain ways. Even these somewhat *abstract ideas* were deemed of value. Now we do not know as much as we might wish about the exact mechanism by which mental states govern, direct, or inhibit responses, but examination of one's own thought and action indicates clearly that ideas, facts, and knowledge do in fact play a vital part. Both the academic psychologist and the pragmatic average citizen agree upon this. One of the most vital phases of learning—acquiring responses—is the acquisition of clear-cut *ideas* of what is to be done. Facts and knowledge represented by ideas are legitimate items of instruction in so far as they contribute to and participate in the direction of conduct, behavior, response.

We may digress at this point to indicate one of the ancient errors of the school—an error responsible in fact for the very attitude of mind in students which necessitates the above explanation in such a book as this. The school long ago fell into the error of confusing the acquisition of facts with true learning. The original and functional relation of facts to activity was lost to sight. The school has taught and still teaches information as an end in itself. "Learning" is tested by testing for memory of facts.

An equally serious error in the opposite direction is the view of certain extremists that "mere facts" have no place at all—that they are incidental—that memorization of facts has no place at all.

Sometimes, to be sure, the effect of ideas on action will be remote, indirect, or delayed for a period of time. Care should be taken to see that facts to be learned, ideas to be acquired, show some reasonably clear connection with the activities of life. It is not safe to make pupils "learn"

series of isolated facts in the pious hope that some day the facts will be of use. This is what McMurry long ago dubbed "cold-storage education." When the acquisition of facts and testing for facts as ends in themselves is confused with true learning, there results what Morrison calls "lesson learning" as opposed to the mastery of objectives of real learning, namely, understanding, attitudes, and skills.

It is therefore true that the learner may be "studying" bodies of information, may be concerned with facts and information. But this material must be such that the ideas resulting from it are related to the guidance of normal activities of life.

The place of emotional responses. The boy who was learning to bat did not of necessity go through the long and arduous training period. He did not have to do it. He could have remained a poor player or even become a spectator. He did not have to submit to the laughter and joking of the onlookers even though this was made bearable in part by the commendation and praise occasionally won. But he did all these things. In fact, no amount of embarrassment or ridicule would have prevented him from going on. Why? He had first an intense *desire* to play on the team—an *emotional urge.* He had a feeling of *loyalty,* boyish to be sure, to the school. He *desired intensely* to find favor with his mates. It was discovered later that he greatly *admired* two of the most skillful performers on the town team and *desired to emulate* them. That is, he was motivated and driven by emotional urges of one sort or another. Furthermore, the boy was somewhat afraid. Unquestionably this emotional state inhibited the free play of his muscles, robbed him of confidence. He built up emotional states that overcame his fear reactions. He acquired confidence, which is partly emotional, and this all affected his acquisition of the desired response—that is, affected his learning.

Again we have a similar situation to the one portrayed in the preceding paragraphs concerning the place of facts and ideas in learning. The psychologist cannot tell us exactly how emotional states affect learning, but he is quite certain that they do. *Ideals, emotional sets, attitudes* of like and dislike, desires, etc., do in fact affect conduct mightily. Indulging in study and in learning exercises which result in building up such *attitudes* and *emotional sets* is legitimate so long as the relation to the complete learning act is not overlooked. The control by *ideals* may be even more remote than that of *ideas*. We make an effort to initiate in childhood those ideals, or emotionalized ideas, that will control conduct not only in childhood but also throughout life as the individual develops and grows.

Here again we must be sure that the attitudes, ideals, and sets will control conduct in beneficial and desirable ways. We must be sure that the ideals in question are related directly enough to life so that they will actually function. The appreciations must not be vague and meaningless, "pious hopes," but definite enough to be discussed intelligently in terms of real life activity.

The place of reflective thought. It is legitimate to assume that the boy learning to bat pondered the advice given him by coach and players. As he walked home, milked the cows, or did other things not requiring his full attention, he may have analyzed the directions given him and attempted to plan mentally how to apply them. He may have rejected some suggestions, accepted others, and modified still others on the basis of his reflection. He may even have attempted to evolve in his mind new modes of procedure to try out in action. Though of a relatively simple sort, all this is reflective thought or problem-solving thinking. Its relation to the control of action, to learning, is obvious.

This indicates very briefly and generally the nature and

relationship of the various phases of learning. It should be emphasized here that another illustration might make some phase other than motor skill the predominant type of response. For instance, learning how to invest one's money, how to critically evaluate the claims of advertisers and politicians would result in training mental skills, memorizing of facts, and the acquisition of certain clear ideas. Motor skill would be relegated to a minor place.

Are there, then, various kinds of learning? The foregoing discussion may be summarized in three statements.

1. Learning consists in the acquisition of changed modes of behavior and reaction.

2. The terms *behavior* or *action* are to be interpreted to include both overt motor activity, and inner mental activity.

3. Certain types of learning may be distinguished and discussed separately for purposes of gaining a clearer understanding.

It should be emphasized and always remembered that, functionally, learning is a complex to which the various types contribute as the situation demands. For purposes of study, however, we may separate certain types of learning activity for formal discussion. In the case of the boy learning to bat the learner was for the most part concerned with perfecting smoothly operating connections between sensations, percepts, ideas, and motor responses. Hence this type of learning is referred to as *sensori-motor*. He may from time to time have devoted most of his attention to acquiring a clear-cut idea of what to do, which is technically known as acquiring percepts. This is *perceptual* learning. Again he may have devoted most of his attention to reflective thought upon directions given him, his difficulties in carrying them out, and possible new ways in which to act. This is *problem-solving* learning. Under the urging of coach and players he may have devoted time

and effort to learning certain of his directions by rote. It is often necessary as a phase of complete learning to *memorize* series of arbitrary associations that assist in the guidance of activity. Although the illustration used does not show it clearly, learning may also be concerned with the acquisition of attitudes and ideals, *emotional* states that are necessary to action. This type of learning has never been well understood. It is discussed briefly and inadequately by most psychologists and educationists. There is as yet no standardized name for it, some persons referring to it as "the lesson for appreciation," "the teaching of ideals," etc. The relationship of these phases of learning to each other and to the psychology of learning may be made clearer by the following diagram: [1]

TYPE OF LEARNING AS COMMONLY DESIGNATED	PRODUCT OR PHASE CHIEFLY EMPHASIZED	PSYCHOLOGICAL PRINCIPLE OR PROCESS INVOLVED
1. Sensori-motor ...	Motor skills, arts	Imitative trial and success
2. Perceptual	Clear ideas of specific persons and objects	Perception (association and sensation)
3. Problem-solving..	Mental skills, general ideas, or concepts, conclusions	Reflective thought
4. Memorizing	Series of arbitrary facts, thought material	Memory, association
5. Appreciation	Attitude, ideals, emotional responses	Emotion, affection

[1] As will be shown in Unit III, Problem 6, these facts may be presented in several different ways. Some instructors may disagree with the present scheme, desiring to add or omit given items. Within the limits of basic principles such changes and variations of the scheme here presented are quite legitimate.

Discussion Questions for Summarizing and Testing on Problem 1

1. Describe from your own observation an example of learning in process. It may be similar to the one opening this chapter, or it may deal with other phases of learning.

2. Analyze the illustration you have just presented showing clearly and concretely how the various phases of learning enter.

3. Accepting for the moment without reservation the definition of learning as the acquisition of responses:

   a. Should anything be taught in school that shows no outcome in worth while response?
   b. Should there be any placing of knowledge in "cold-storage" at all? If not, what changes should be made in teaching as at present conducted? If there should be some "cold-storage" education, how are we to know what ideas to learn which will be useful later?

4. What responses, if any, valuable in the ordinary affairs of life result from learning:

   a. The capitals of all the states
   b. The list of products grown in subtropical regions
   c. How to compute cube root
   d. Why the United States returned the Boxer indemnity money
   e. How the Gettysburg address is regarded and why
   f. To recite from memory the Constitution of the United States, passages from *Hamlet, Lady of the Lake,* etc.
   g. The argument in Burke's speech
   h. How to dance a quadrille, a fox trot, a Hollywood "stomp"
   How to recognize words in print
   How to remain cool even when under provocation to anger
   k. That the square on the hypotenuse of a right angle triangle equals the sum of the squares on the other two sides

5. Take each of the above that actually have responses, and classify the response according to the phase of learning involved.

6. We often hear it said of certain baseball players, or other skilled performers, "He uses his head." Often a coach will admonish a player by saying, "Use the bean." What phase of learning is the coach after here?

7. Some one has said that the traditional arrangement of a school room and the nature of the desks used were chiefly designed for listening purposes. Contrast our definition of learning with the idea of learning which must have been held by those who planned the traditional school.

Parallel Readings for Problem 1

1. Colvin, S. S., *The Learning Process* (Macmillan Co., 1919), Chs. i and ii. Somewhat older treatment. Not so easy to read, but good.
2. Bagley, W. C., and Keith, J. A. H., *An Introduction to Teaching* (Macmillan Co., 1925), Ch. ii. Poorly organized but concrete and interesting to read. Easily understood. Ch. ix is excellent.
3. Cubberley, E. P., *An Introduction to the Study of Education* (Houghton Mifflin Co., 1925), Chs. xii and xiii. Good discussion of traditional type.
4. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Chs. i, ii, iii. Interesting and valuable presentation. Well written and easily understood.
5. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), pp. 89-99.
6. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920). Brief summary of types in Ch. v.
7. Waples, Douglas, *Procedures in High School Teaching* (Macmillan Co., 1927), Ch. iii. Interesting and valuable technique illustrated.

PROBLEM 2

MAY LEARNING BE CORRECTLY DEFINED IN MORE THAN ONE WAY?

Exploratory and Pre-Test Questions

None.

Thorndike defines learning in his earlier writings very simply as "changes produced in the learner." Freeman discusses it as "the modification of inherited responses and the acquisition of new responses." Colvin phrases it, "the modification of the reaction of the organism through experience." Charters expresses it as "gaining appreciation and control over the values of life." The central thought in all these is the same as that developed in the opening pages of this unit.

Learning as the acquisitions of adaptations. A recent discussion by Morrison introduces a view of learning that differs in some points from that so far expressed. He says: [1]

> . . . any actual learning is always expressed as a change in the attitude of the individual, or as the acquisition of a special ability, or as the attainment of some form of skill in manipulating instrumentalities or materials.

He goes on to say, "the new attitude inevitably modifies his whole social behavior." The other items in his definition, *abilities* and *skills*, are obviously modes of behavior. He refers [2] to these learning results (excepting skills) as

[1] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), pp. 19 *ff.*

[2] *Ibid.*, pp. 22 *ff.*

adaptations, using the term much as biologists use it, to mean an actual change in the organism itself. "The test of a real product of learning is its permanency and habitual use in the ordinary activities of life."

His learning products may be outlined somewhat as follows:

I. Adaptations
   a. Attitudes of understanding
   b. Attitudes of appreciation
   c. Special abilities
II. Skills

By attitudes of understanding he means the acquisition of broad general ideas, concepts, special beliefs, etc., that will guide conduct. Attitudes of appreciation include love of truth and beauty, right attitude toward conduct, standards of taste and enjoyment in literature, decoration, etc. Special abilities include reading, computing, use of language. Skills mean for Morrison what they do in any other discussion of learning. So far his views on learning are practically in accord with those of other authorities.

He then introduces a number of new ideas which he himself says are at variance with the commonly accepted traditional beliefs. These points are still in the realm of controversy but distinctly stimulating to thought. Furthermore, they are unquestionably affecting practice everywhere. The following descriptive discussion will set forth the points involved.

An adaptation is, in the first place,[3]

> . . . a unitary thing, and the pupil has either attained it or he has not. Individuals may differ greatly in the length of time and in the ease with which they take on the change which a given adaptation implies, but, if two pupils have attained a given adaptation they cannot differ with respect to the fact of their attain-

[3] *Ibid.,* pp. 23 *ff.*

ment. Skill, on the other hand, is essentially a variable. Any individual can be at different points on the curve of skill development at different times, and it can be truthfully said that at each point he has some skill. . . . If a student has fully acquired a piece of learning he has mastered it.

To Morrison mastery means completeness. To achieve an actual adaptation the pupil must have completely learned. Prior to mastery we may say that he has begun to learn, that he is making progress, that he has almost learned. That is, he is performing learning activities and manipulating assimilative material. These things are often confused with true learning, as will be shown later in this volume. But he has not learned unless he has derived from these materials and activities an understanding, attitude, or ability of which he is master. In the mastery of unit learnings the pupil either has it or he has it not.

An understanding of what Morrison means by *unit learnings* is necessary before one can justly evaluate the foregoing point The assumption is made that the outcomes of learning can be stated in terms of the definite attitudes, understandings, abilities, and skills to be acquired by the learner. These outcomes must be truly unitary, elemental. They are the *unit learnings*. Conversely, the outcomes of learning are not to be stated in terms of facts remembered, questions answered, examples worked, papers written, books read, or courses covered. These are means to the end. They are the materials and exercises out of which learning should arise. If the learning products can in fact be stated as basic elemental units, and identified as such, it seems quite logical to say that we can determine whether the pupil has or has not learned any given one of them. For example, reading or ability to compute (arithmetic) would seem to be fields of learning in which the traditionalist would say that there were obviously degrees or stages of learning or mastery. However, Morrison

points out that the complex thing lumped off under "reading" or "arithmetic" is in reality made up of a series of units, each complete in itself and representing a learning adaptation to be mastered before going on to the next necessary attitude, ability, or skill. To be explicit, a child who has *learned to add* can identify situations that require the addition process, and can perform the activities necessary. To be sure he will make arithmetical mistakes due to carelessness, haste, lack of automatic skill, but he has learned to add when he knows when to add, desires to add correctly when this is the proper response to make, and can perform the necessary operations with ordinary accuracy. He has *mastered* a unit. The mastery of many similar units will be necessary before he has *learned* arithmetic. As he progresses through this series of units he may appear to have "partly" learned the subject. Rather, Morrison would say, he has entirely learned some of it, and not at all learned the rest of it.

The difference between true and pseudo learning, and between mastery and so-called "partial" learning is clearly shown in the following case. A child was found who could add, multiply, subtract, and divide accurately when told to do so, but when left to herself was just as likely to subtract numbers intended to be multiplied or divided, or vice versa. Since she could add a column correctly, could multiply and divide large numbers accurately when told to add or to multiply, most teachers and parents would say that she had learned, at least learned "in part" to add, multiply, subtract, and divide. But in fact the child had learned none of these things even "in part." Diagnosing her difficulty, a teacher elicited the following statement from the child:

> I know what to do by looking at the figures. If there are only two numbers with lots of parts [digits], I subtract. If there are lots of numbers, I add. But if there is just two numbers, and

one is littler than the other, then it is a hard problem, so I divide if they come out even, but if they don't, I multiply.

The child is obviously in the stage that most people would call "having partly learned." As a matter of fact, she has not learned (to add, multiply, subtract, or divide) at all. She has memorized number combinations and has acquired certain skills in manipulating them. She has quite obviously learned something (the associations and skills), but she has not even "in part" learned to add or subtract. The fundamental in addition is to recognize situations that may only be solved by that process. The understanding is then carried into action through exercise of certain skills. This child acquired the skills first, and has not mastered the understanding at all.

Similarly, the advanced student who has acquired the ability to do problem-solving thinking understands the process, is able to recognize situations necessitating its use, and possesses certain skills in gathering, organizing, and evaluating data, and in drawing and verifying conclusions. The skills may show degrees, specific information necessary for the solution may be easily available or unattainable, but for the basic adaptation of understanding there can be no degrees. The student either knows how to go about solving problems, or he does not know how to do it.

The view that there are no degrees or levels in learning within a unit is opposed by many teachers and questioned by many educational psychologists. The final answer will rest with the experimentalists. We are here concerned only with an exposition of the theory and its assumptions. Two points, however, may be noted which may in part explain the difference of opinion. First, what seems to be a difference of opinion regarding the fundamental nature of learning may be due to a difference in terminology. A great deal depends, as explained in detail above, upon what is meant by

learning and *unit learning*. Second, the idea that there are levels or degrees in the mastery of a given learning outcome is unquestionably due in part to the common confusion between true *learning* (under any definition) and the *performance of learning exercises*. Teachers have for generations tested learning by asking pupils to work exercises, problems, to repeat formulas, and to reproduce material exactly similar to items used during the learning process. Sometimes the test for learning has included some of the identical exercises that were performed during the learning period. Who has not met in the final examination some of the same problems studied earlier in the course? Students solve varying proportions of the exercises, or perform varying proportions of other tasks set, and are then judged to be 60, 70, 80, 95 per cent perfect. Learning very obviously seems to have degrees. But learning has not been tested, there has been merely the performance of various learning exercises. Learning has been confused with performance. True learning can only be tested by new situations, real problems, and, finally, perhaps only by the demands of life activities. (Testing for skills may of course be carried out by means of repetition of previously used exercises.)

Another controversial point in this theory is the assumption that all normal pupils,[4] if properly taught, can learn, that is, achieve mastery of desired and appropriate learning products, progressing from mastery to mastery as interest, speed, and maturity permit. The suggested "mastery formula" is pre-test, teach, test the result, adapt procedure, teach and test again to the point of actual learning As stated above, rate of learning will differ materially among pupils. Others may suffer intellectual and emotional handicaps, or other interference that prevents learning. The key to the situation lies in the testing and adaptation

[4] Morrison, *op. cit.*, pp. 559 *ff.*

of procedure embodied in the formula. It is the task of the school to diagnose cases of nonlearning and attempt to remove or overcome the obstacle. The diagnosis of ordinary cases of nonlearning must be supplemented by the extended and technical diagnosis of special and complex cases which will also be found. Some pupils may be found who will need special individual treatment. Pupils who are not normal or who are so severely handicapped as to be beyond the help of ordinary school situations will not learn. The validity of this phase of the theory obviously turns upon the definition of a normal pupil, and upon the nature and power of available diagnostic and remedial procedures.

Still a third characteristic [5] of learning suggested by Morrison, which differs from commonly accepted views, is that learning is permanent:

> The ultimate test of a product of learning which has involved a genuine adaptation is that it is never lost, otherwise than through its transformation into new adaptations or through the rise of pathological inhibitions. It is never lost by simply fading out. The reason, probably, is that the act of genuine and successful learning has resulted in permanent changes in the organization of the elements of the central nervous system. . . .
>
> Why does it happen that some learning persists and other learning fades out? The answer is obvious: Some things were in fact learned and others were not. Some had amounted to actual adaptations; others had been mere memory content, good until after examination and then lost.

Again the educational psychologists differ, believing that learning products do fade out, do become less clear, and even disappear altogether. It is known, of course, that old learning may be more quickly revived than new learning acquired, indicating some persisting effect of the original learning. The difference may again be more one of ter-

[5] *Ibid.*, pp. 23 *ff.*

minology than of fact. Taking true examples of unitary adaptations, it is difficult to see how they could be "forgotten." A student who actually understands the doctrine of freedom under law and has acquired the necessary attitude toward it, who understands the atomic theory, or the doctrine of evolution, or the germ theory of disease, the principle underlying the solution of problems involving unknowns, has acquired modes of viewing life and of ordering his behavior. Once understanding the germ theory of disease, he cannot conduct himself as he did before understanding it. It is a part of his life, and it does not seem sensible to say that he could "forget" it. Similarly with the student who has actually acquired a standard of taste in literature, a correct attitude toward moral questions, an understanding and appreciation of taste and color combination in dress or interior decoration.

Advanced students often cite, in opposition to the mastery theory, cases of individuals who acquired a love for good literature, but who in later life read detective stories or light literature, or read not at all. They have lost, say the critics, the original adaptation. Disregarding for the moment the possibility that the reporter may be mistaken on the fact of original adaptation, it must be pointed out that unavoidable circumstances may prevent the use of desirable and genuinely acquired learning responses. If the harsh conditions of life later prohibit the use of an acquired response, or if the learner later acquires another response which he accepts in place of the first, it is not correct to say that he has "forgotten" or failed to "master" the original response. This is not forgetting, but it is a situation in which the learner does not have freedom to use such responses as he has and may desire to use. Many people possess genuine understandings and appreciations regarding dress, interior decoration, and the collection of beautiful things but lack sufficient means to make the

proper responses. Such illustrations can be duplicated for almost any learning product.

Whatever may be the outcome of controversy over unit learning, mastery, the possibility of mastery for all normal pupils, and permanence of learning, educational practice is certainly indebted to the controversy itself. Although the final answer must wait upon the derivation of further experimental evidence, it is distinctly stimulating to traditional educational practice to attempt specific definition of learning outcomes, to attempt techniques designed to beget genuine learning, mastery, in all pupils. As indicated above, our present diagnostic and teaching techniques would not be equal to the task, even if the ends were agreed upon. Sincere effort, however, to test the theory in practice should not only improve practice in general but in specific should contribute to the removal of at least one obvious educational absurdity, high grades in school coupled with ignorance and inefficiency when the same person meets real situations. The whole body of doctrine is in fact vitally affecting practice everywhere. Two dangers are to be avoided, easy, uncritical, enthusiastic acceptance, and stubborn, uncritical rejection. The theory of unit learning should be *understood* before being either *accepted* or *rejected*.

Discussion questions on Morrison's views. After studying the foregoing discussion of this definition of learning and its controversial points, the student should prepare answers to the following questions. Some will be difficult because of the brevity of treatment above. If supplementary assignment is necessary, the instructor will find suggestions following the questions.

1. Be able to state clearly and *in your own words* what Morrison means by *adaptations*. Do this at first in terms of a general definitive statement, saving specific illustrations for the following question.

2. Consider the tabular presentation of learning products according to Morrison:

I. Adaptations
(Attitudes of understanding, appreciation: special abilities)
II. Skills

a. Select a specific attitude of understanding, a unit learning, derived from study in any field—history, geography, hygiene, economics, or what not. State it in specific terms.
b. Do the same thing for an attitude of appreciation. Be sure that these things are stated in complete and definitive terms. Vague generalities will not guarantee understanding.
c. Give in specific, concrete terms evidence which would indicate the possession of a given adaptation by an individual. That is, how would any of the adaptations you have listed above affect the actual conduct of the individual.

3. State specifically wherein Morrison's list of learning products is similar to, or differs from, the discussion of learning types given in Problem 1 of this unit.

4. Granting that Morrison's meaning for *adaptation* were to be accepted, what changes would be necessary in the common educational theory and practice (particularly the latter). You cannot answer this completely at present. However, make as long and as well organized a list as you can of specific items.

5. Certain experienced teachers often oppose vigorously the idea of "mastery" as promulgated by Morrison. Make a list of the probable causes (worthy and unworthy) for their opposition and for their statement often made that mastery is impossible of attainment. Be very explicit. Distinguish sharply between superficial and fundamental reasons for the teachers' attitude.

6. A curious paradox is to be noted in the attitudes of many people in general toward education. Many people sneer at "book learning," but none the less spend money for it. People sneer at the educated man but insist that their children get education. Other similar illustrations could be given. These various contradictory attitudes are manifested at different times by one and the same group.

a. How do you explain this odd and paradoxical situation?
b. Can you analyze the situation and differentiate some elements justifying the criticism and distrust of education?
c. What, really, is the fundamental criticism and cause for this distrust?

The last question is a difficult one and perhaps cannot be answered well at this stage. A careful study of the brief summary of Morrison's views should supply the alert student with a beginning in the matter, however. The question will appear again in a later discussion when more data are available.

Supplementary assignment. For present purposes, giving the student the salient facts regarding the nature of learning and differing opinions thereon, the foregoing résumé of Morrison's views should be sufficient. However, some classes of younger students lacking background may need further study. Furthermore, the instructor may wish to give his class a broader insight into Morrison's writing. Answers to the questions above will indicate in some measure whether a class needs more study or not. If desired, another lesson can be devoted to the following material:

MORRISON, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Chs. ii and iii.

Learning as the formation of bonds. If we examine the definitions of *learning* advanced by another group of writers, we find still another point of emphasis. Gates says, "learning is modifying old or acquiring new patterns or connections.[6] Kilpatrick uses similar language, "acquiring new bonds or changing old ones is what we mean by learning." And again, "learning is the formation of S→R bonds." What are *patterns, connections, bonds?* Does defining learning in these terms change the meaning fundamentally, or can this definition be related to the one advanced in the early pages of this volume?

Emphasis on patterns, connections, or bonds in describing learning can be traced to Thorndike's presentation of the psychology of learning in which he makes much of the neural mechanism. On the basis of present knowledge

[6] See references in "supplementary assignment" below.

about the structure and function of the central nervous system it is an accepted theory that the way one responds is determined by the nature of the connections that have been formed between neurones or a series of neurones. That is, a stimulus is received by an end organ or sensory nerve ending, carried in over a series of nerve fibers or neurones, redirected in any of several ways by central nerve bodies, and carried out to the muscles by still other

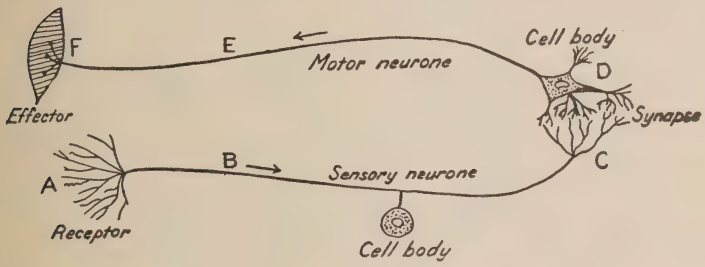

FIG. 1. DIAGRAM OF A SIMPLE REFLEX ARC, OR SITUATION-RESPONSE UNIT CONSISTING OF A SENSE ORGAN, SENSORY NEURONE, SYNAPSE, A MOTOR NEURONE, AND A MUSCLE.

The arrows show the direction of the nerve impulse. In the diagram, *A* represents the fine sensory nerve endings in and about the sense organ. A nerve current is initiated when the sense organ is stimulated. Action results when the impulse reaches the effector (*F*).

neurones. These connections or pathways over neurones and synapses (junction points between neurones), Thorndike has called Stimulus-Response bonds, or S→R bonds. The terminology has been widely used by his students.

The foregoing makes clear the general nature of the S→R bond or sensori-motor arc. It is not necessary for our purpose to go into detail here. One further aspect of the problem may, however, be presented with profit. These bonds may be of various degrees of complexity and involve various levels in the spinal cord or brain, and hence various levels of consciousness.

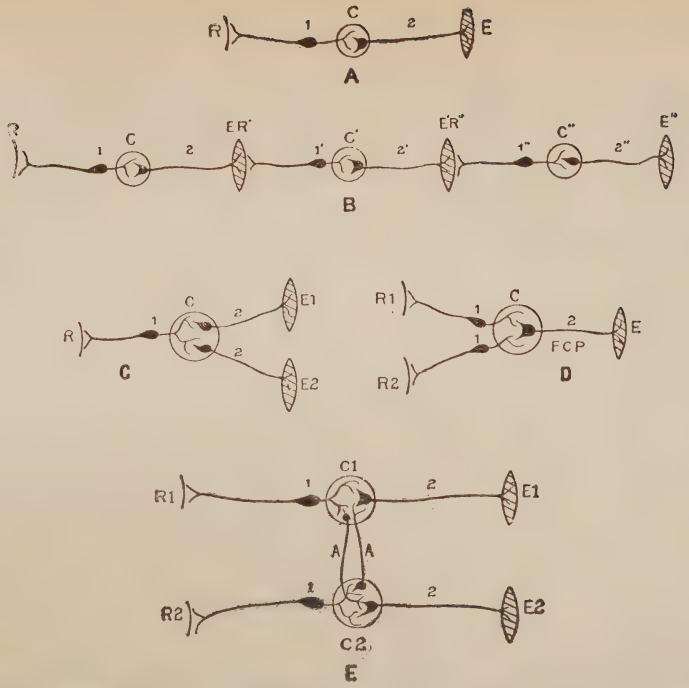

FIG. 2.—DIAGRAMS REPRESENTING THE RELATIONS OF NEURONS IN FIVE TYPES OF REFLEX ARCS

A, Simple reflex arc; B, chain reflex; C, a complex system illustrating allied and antagonistic reflexes and physiological resolution; D, a complex system illustrating allied and antagonistic reflexes with a final common path; E, a complex system illustrating the mechanism of physiological association. *A, A,* association neurons; *C, C', C", C1,* and *C2,* centers (adjustors); *E, E', E", E1,* and *E2,* effectors; *FCP,* final common path; *R, R', R", R1,* and *R2,* receptors. (From Herrick, *An Introduction to Neurology,* W. B. Saunders Co., Publishers.)

Complexity may vary from a pathway or bond involving but two or three neurones, to one involving a very large number. Degrees of consciousness vary with brain level involved, ranging from no consciousness at all, as in the case of reflex acts which involve only the spinal cord, to those of fullest consciousness, involving problem solving

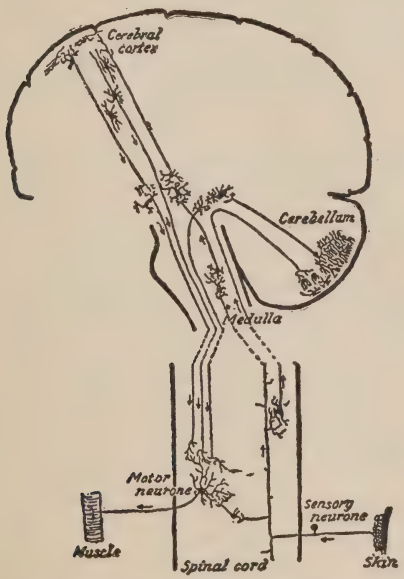

FIG. 3. SCHEME OF NEURAL PATHWAYS FROM A SENSE ORGAN IN THE SKIN TO A MUSCLE.

Arrows indicate possible courses taken by a nervous impulse. The neurones are shown enlarged out of all proportion to the size of the brain and cord. (After Starr.)

and calling into action the higher association areas and cortex.

On the lowest level the S→R bond or sensori-motor arc is simple and direct, passing with few exceptions directly through the spinal cord with no recourse at all to higher centers. On the second level the impulse travels up the cord

to the lower brain centers before being redirected to the proper motor neurones. This happens in the case of habits and simple coördinated acts. In the highest type the impulse travels to the association areas where presumably thought takes place and the impulse is then redirected in terms of the analysis and discrimination which have taken place. In this case the complexity of the bond is enormously increased. All the facts concerning what takes place within the higher areas of the brain are not known. These three types of bond or arc are roughly schematized in Figure 3.

In definitions of learning of this type emphasis is placed on the neural or physiological mechanism which makes this response possible. Thus learning is the acquisition of new, or the modification of old, neural pathways, connections, or patterns. Comparing this with the other definition of learning, namely, the acquisition of responses, we can see that two aspects of the same thing are being emphasized. A change in behavior or a new response means the formation of new bonds and vice versa. Understanding of the bond theory enables us to see the nature of learning somewhat more clearly, particularly for the simpler types. It is difficult to explain some of the more complex learnings in terms of known facts about the nervous system. In the effort to explain complex learning acts some exponents of this theory have oversimplified the matter, thus defeating their own purpose.

Supplementary assignment. It is assumed that students using this volume have had a beginning course in physiology or psychology and have a general understanding of the structure and function of the nervous system. It is quite possible, however, that this knowledge has become somewhat hazy, or may be lacking for some members of the class. Two supplementary assignments are suggested based upon experience with such situations:

1. The instructor may draw rough diagrams upon the board and briefly lecture such additional material as he deems necessary. The meaning and function of the following list of terms may be quickly and concretely explained. All except the most immature classes will gain such understanding as is necessary. Terms to be explained: *neurone, sensory* and *motor neurones, afferent* and *efferent, synapse, dendrite, axon, bond, pattern, stimulus, response, end organ, reflex arc, sensori-motor arc, ideational level.*

2. It may happen that a majority of the students have no knowledge whatever of these matters. Or the instructor may deem a much more detailed knowledge necessary than that given in the text above. In that event, assignment may be made to any of the following and another lesson devoted to the material.

Freeman, F. N., *How Children Learn* (Houghton, Mifflin, 1917), Ch. ii.
Kilpatrick, W. H., *Foundations of Method* (Macmillan Co., 1925), Chs. ii and iii.
Skinner, Gast, and Skinner, *Readings in Educational Psychology* (D. Appleton & Co., 1926), Chs. ii and iii.
Smith and Guthrie, *General Psychology in Terms of Behavior* (D. Appleton & Co., 1921), Ch. i.
Betts, George H., *The Mind and Its Education* (D. Appleton & Co., 1923), Ch. iii.
Breese, B. B., *Psychology* (Charles Scribner's Sons, 1917), Ch. ii.
Angell, J. R., *Psychology* (Henry Holt & Co., 1910), Ch. ii.
Gates, A. I., *Psychology for Students of Education* (Macmillan Co., 1923), Chs. ii and iii.
Or any standard psychology.

Discussion questions. If detailed study of this topic is required by the instructor, the following questions may be used for discussion and for testing understanding. Some of them emphasize function and process within the nervous system, others stress the relation to learning.

1. Go to the board and draw a diagram representing the neural mechanism necessary for performance of a simple reflex act. In the functioning of a habit. In an act requiring deliberation. Explain what happens in general. Do this in your own words, using nontechnical terms.

2. Draw a diagram and explain what happens when a person

sneezes. When a person walks along the sidewalk. When a person walks along a strange path in the dark.

3. Draw a diagram and explain what happens when a person tries to pick up a slippery piece of soap, finally securing it after several trials. Explain how past learning was involved.

4. Draw a diagram and explain what happens when a baby learns to walk. When a circus performer learns to walk a tight rope. When a girl learns to typewrite.

5. Draw a diagram and explain what happens when a person decides whether or not to give money to a beggar. When a juryman weighs the evidence presented by opposing lawyers.

Is the foregoing a comprehensive and complete discussion of learning? Obviously it is not. So far discussion has been confined sharply to the basic ideas essential to an understanding of the nature of learning. The details and complexities of the types of learning will be elaborated in Unit III of this volume. The student is also aware from his own experience as a learner that many subsidiary pupil activities are involved such as studying, practicing or drilling, reciting, reading, organizing and presenting thought, using the laboratory, etc. He is also aware that the teacher stimulates, guides, and directs learning by planning, assigning, supervising study, asking questions, etc. The relation of these to learning will be presented in Units IV and V. A reference to the table of contents of this volume at this point will assist the student in seeing the organization of the course he is about to take.

There are still other items that need to be discussed in connection with learning. It will have been noted throughout the foregoing discussion of learning that the learner contributed a part, namely, his desires, efforts, and already acquired responses. The world about the learner also contributes a part, namely, ideas, suggestions, standards, devices that have become standardized through the countless experiences of previous generations of learners. The contribution from outside constitutes a body of material in

itself. In the case of the boy learning to bat we can see the interplay of the two. He already knew how to grip a bat, to swing, to stand, to follow with his eye. He did not know how to do these things with such coördination as to be successful in his efforts to hit the ball. He also had desires and ideas about the matter. But there existed in the world knowledge of ways of standing, swinging, keeping one's eye on the ball. A body of past experience has been built up which exists in the minds of other players, and much of it has even been crystallized in print—the typical subject matter of the school.

It is obvious then that we must know something about the nature of the learner, and also something about the nature of the material upon which the learner will exercise his activities. Teaching has for long been concentrated upon the second factor, subject matter drawn from the social inheritance. In modern times more attention has been paid to the other factor, the nature of the learner. One of the chief tasks of the teacher in stimulating learning is to adapt the material of instruction, subject matter derived from the experience of the race, to the interests and capacities of the learner. In this volume and course we are chiefly concerned with the direction of the learning process that should result when learner and material are brought into proper contact. Information about both the nature of the learner, his reflexes, instincts, capacities, habits, and about the nature and organization of material will be utilized throughout the course as it is needed at any point for complete understanding. Complete and organized discussions of the mental and physical characteristics of the pupil population, and of the organization of materials, are the subject matter of other volumes and courses. It is assumed that the student in this course has had at least one and preferably two previous courses in Education in which he acquired sufficient understanding of the nature of the

learner and of subject matter to be able to interpret the present discussion.

NOTE: This discussion is purposely confined to two common and widely used definitions of learning merely to introduce the student to the fact that various conceptions exist. Instructors may introduce discussion of other definitions if they so desire.

Parallel Readings

These have been indicated in the body of the text.

PROBLEM 3

WHAT ARE THE COMMON MISCONCEPTIONS CONCERNING THE NATURE OF LEARNING?

Exploratory and Pre-Test Questions

Confusing performance with learning. In the earlier pages of this unit, reference was made to a common error of the school in teaching facts and information as ends in themselves; to the further error of confusing learning with the exercises designed to beget learning. The following exploratory questions will serve to initiate discussion and to focus analysis on the essential point involved.

1. A girl about to take the state teachers' examinations in various school subjects, discovered the night before the examination that she must take the quiz in agriculture. She had overlooked this in the announcement of the examination, but she hurried out and bought the state-adopted text, sitting up all night to read it through. Next day she took the examination and received a grade of ninety-six!

a. Did she "learn" agriculture? What did she "learn"?
b. What erroneous ideas and ideals lie back of such a situation? What detrimental beliefs about learning are encouraged by this common procedure?

2. Morrison relates that a student called into conference because of unusually bad English in his written papers, answered the criticisms by saying, "But, I have always had good marks in English in both high school and college." When pressed further with specific illustrations of impossible sentences and absurd grammatical construction, he tried to settle the matter by saying, "I will get my English grades from the Recorder's office and bring them to you."

a. If this student had been asked to define *learning* and had earnestly tried to construct a definition, what would he have

said? Stick strictly to what is revealed in the foregoing brief paragraph.

b. How do you account for "good grades in English" coupled with poor performance in writing and speaking the language?

c. The instructor and student above were not speaking the same language. Show wherein they were not.

3. Some years ago the application of a student for a well paid fellowship was rejected because his grades were far below the level required. Personnel reports indicated generally low-level attention, lack of habits of application, of persistence, of attack, etc. Learning this, the student came and pleaded to be accepted. He admitted frankly that his grades were low because he had gone out for campus activities, had enjoyed college life, and had put his attention on gaining benefits from college other than those derived from the classroom. But he said that he knew he could do the work if given the fellowship; he was settled now and would dig in; he would study, it was easy for him; he would get his work done and on time; he would organize and turn in the reports required, etc., etc. He was told as kindly as possible that in reality he would not dig in, he would not be able to do the work, he would not be able to organize the work and compile the detailed reports necessary, even though he was given credit for sincerity in saying and believing that he would. The instructor explained that he had had four years' excellent training in *not* digging in, in *not* studying, in *not* getting through on time, in *not* attacking and solving problems that were difficult and complex. "But," said he, "that doesn't make any difference *now,* I'm ready to work and I know I can do it."

a. Explain the instructor's apparently hard-hearted attitude in terms of the accepted definition of learning? In terms of the bond theory.

b. Try to construct a paragraph giving in some detail this student's ideas about the nature of learning, of ability to do, judging from his statements.

4. What is meant by a *gentleman's* grade as the term is commonly used in many colleges? (If you have never heard the expression, what do you think it means?)

a. What do those who seek *gentlemen's grades* believe learning to be?

b. What do they see as the purpose of the school?

c. What do they miss, and fail to acquire?

d. Is the school sometimes partly at fault in this matter?

5. What do we mean by a *grade hound,* a *greasy grind?* Why are these used as epithets of contempt?

a. How do people to whom the term is applied evidently regard learning?

6. It is true, however, some critics to the contrary notwithstanding, that the high-grade man, the honor student, is the one in fact who does make good in the world. Does this not seem to contradict the conclusion drawn from the foregoing questions? How do you explain the seeming contradiction?

Traditional school practice has been to treat the content of books and courses as the learning product to be mastered. Small pieces of this content, "lessons," were studied (memorized) and recited back to the teacher. The history of the progressive divorcement of facts from their proper relation to learning, and the rise of facts as end points in learning is a long and interesting one, but details are not essential for our purpose here. Storing up great funds of information in the mind is what McMurry ridiculed as "cold-storage" education. Mastering subject matter instead of using this assimilative material with which to arrive at understanding, appreciations, and abilities has been labeled "lesson learning" by Morrison. He also says that "the pupil learns from experience, but he has not learned the experience." That is, the facts, definitions, details, illustrations are to be utilized in the acquisition of basic beliefs, understanding, appreciations, etc. The latter are the learning products, the experiential matter merely a means to the end.

For a hundred years the reaction has been gaining ground. Later in this volume we will discuss in some detail the Herbartian "five formal steps," and such more recent procedures as the project, supervised study, the socialized recitation, direct method of teaching language, emphasis on language habits instead of grammar rules. The "five formal steps" were an effort to get away from

the conning of isolated facts in a series of "lessons." The learner utilized facts, narrative and descriptive material, or any necessary subject matter, but was led to organize it so that there resulted a generalization, a rule or principle, an understanding that would be effective in the control of action. For all the ridicule heaped upon them lately the five steps were a worthy pioneer effort to rescue learning from "cold storage" and to focus attention on learning as the acquisition of clear-cut ideas and ideals as guides to action. So also the modern movements mentioned all tend to focus attention on learning as the acquisition of modes of response, as contrasted with identifying learning as the mastery of facts, the learning of books, courses to be covered. The caution should be injected here that the superficial use of the modern organizations is not sufficient. In many places we have projects, problems, activities, but the end is still the same, mastery of isolated items of information.

The natural and inevitable outcome of misconceiving the true end of learning is the substitution therefor of the memorization of facts, the ability to reproduce what has been read, the ability to outline readings and lectures, the ability to work exercises according to pattern. These are pseudo learnings. Not only is the real learning product lost sight of, but it is actually precluded because rewards are given for other things. Satisfaction results from performance of the pseudo learnings. The result is a "book learned" person, more or less helpless in making decisions, ordering his conduct in the affairs of life. It is the type of education that gives us "educated fools," people full of "fascinating facts."

As stated elsewhere, facts, information, ideas are absolutely necessary. We may legitimately "study" and "learn" facts. We may test for their memorization. This must be done, however, with full realization that the facts are not

ends in themselves but necessary in the development of worth while learning products. Little perversion of learning will result if the proper relation of the retention of mere facts to the acquisition of responses is kept clearly in mind.

When retention of facts or ability to do what the instructor wants is stressed as the desirable outcome, then obviously the testing of learning is done by giving the pupil "more of the same." That is, we ask him to repeat the facts already studied instead of asking him to use these facts in solving a new problem. We ask him to reproduce the professor's lectures or to outline them instead of to react critically, or to try and apply the ideas in new situations. Of course an occasional student bent on learning in spite of the school does react critically or try to use the ideas given him in real situations. The results are often embarrassing to both student and instructor. The learner soon succumbs and routine is substituted for reaction. Performance is accepted for learning.

In the main the student sees the grade that represents his ability in recalling material, in following directions, in doing as he is told. He comes to work for the grade. Any and all methods are allowed if the grade is won. Thus we have a second evil resulting from confusing performance with true learning. Not only is the real learning not achieved, but the symbol of the false learning becomes unduly important. It becomes an end with the learner. Not only is true learning obscured and largely made impossible, not only is a false aim set up, but highly undesirable attitudes and ideals are "learned." Practices inimical to learning are introduced, of which cramming and cribbing are the best known. When earnest effort to devise real tests is made, cramming is a waste of time, and cribbing largely impossible. Furthermore, undue stress on the "passing grade," quite apart from high or low grades,

engenders habits of half-effort, half-attention, doing just enough to get by. Students working for this never get the mental training that undoubtedly results from vigorous and sustained attack.

But, it may be asked, are not high grades indications of learning? If a student works for high grades, does he not learn? Not necessarily so. Statistical evidence does indicate clearly that except for some commercial lines, the honor student, the high-grade man, is in fact the one who succeeds in life. This is not the same thing as saying that working for high grades so trained him as to guarantee success. The student with high grades (excluding the "grade hound" type) has learned, he is on the way to success, not because he worked for high grades but because the type of work he did incidentally entitled him to high grades. It is the type of work that guarantees alike high grades in school, real learning, success in life. In doing this type of work he acquired habits of sustained attack, habits of study, the ability to critically evaluate evidence, the ability to gather data, etc., which are the foundations of success. The grades are incidental.

The distinction between true and pseudo learning will be discussed again in Problem 3, Unit V on testing. Briefly we may say that the best indication of the presence of true learning is the appearance and functioning of the new response in real situations. Performance testing is to be avoided. The repetition of situations designed to beget learning is not a guarantee of learning. The re-citing of old subject matter or assimilative material is not a guarantee of understanding. A new situation must be devised to test understanding and ability. Carried to extremes this would mean that much learning could never be tested until the problems of real life tested it. In fact, we can never test certain learnings with sureness until real tests are presented outside of school. For instance, we cannot be sure

of your understanding of the nature of learning until you begin practice teaching or take over your own school room. But we can ask you to write out theoretical modes of procedure, we can present actual teaching problems that have risen in the past and ask you to solve them theoretically. We must devise tests of this hypothetical nature as nearly like real life problems as we can. These should give us symptomatic evidence as to whether or not learning had taken place. The discussion questions in this volume (excepting pre-test questions) are attempts to construct tests which will give us reliable evidence of learning. Your instructor will doubtless devise others and ask you to devise some, which latter procedure is in itself an excellent test of understanding.

Confusion over the nature and application of various legitimate learning products. Confusion between learning and that which is not learning is not the only misconception with which we have to deal. There is also often much confusion and misconception concerning the nature, power, and use of various learning products, each of the latter being genuine in itself. The following story illustrates the problem admirably. In competition for a substantial prize offered by civic bodies a high-school student submitted a remarkably fine "Civic Code" setting forth the ideals, duties, and functions of the good citizen. His code was widely printed, the student was duly acclaimed as having learned some of the basic things in good citizenship. Six months later he was arrested for bombing the office of the leading newspaper, and it was discovered that he had been for some time associating with and participating in the escapades of a gang of young bootleggers and terrorists.

The first reaction is to say that this boy had not really learned about citizenship, that his code was an empty verbalism. This is about as far as the superficial analysis of

the average citizen goes. The situation is somewhat more complicated. The explanation is not that the boy had not learned, but that he had learned the wrong kind of response for the situation involved. As indicated in Problem 1 of this unit, there are five types of learning, each resulting in type responses. These various learning responses control differing situations in the world. The school has relied traditionally on intellectual understandings as the proper learning with which to control most life situations. The school traditionally has neglected other types, particularly the appreciative or emotional learnings. In this particular case, the school supplied intellectual learning, responses of understanding, assuming that these would control emotional or moral situations. Instead, the necessary learning responses here were of the emotional or appreciative sort, attitudes rather than an understanding plus habits of action. These the boy did not have, though he had quite obviously learned and learned well the intellectual understandings necessary to good citizenship. Morrison [1] discusses the problem here thus:

> An understanding attitude toward the moral order of the day is pedagogically a thing wholly different from the right attitude which rules conduct. To know what is right is one thing; to love right and hate wrong is quite another. In the one case, we have a learning product which is achieved through science-type procedure; in the other, one which arises out of teaching in appreciation.

Of course intellectual learnings are involved in the matter, though the emotional responses are the ones that guarantee real action.

The point of this somewhat extreme illustration is that it is not only necessary to know the nature of true learning responses but to know what situations in life the vari-

[1] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), pp. 375 *ff.*

ous learning responses can be expected to control. The ordinary nonemotional affairs of life are controlled reasonably well by intellectual learning. Situations involving emotional stress are not at all controlled by such learning. Situations involving the actual doing of things cannot be controlled by merely knowing how to do them, though that will help. In many instances habits and skills as responses must be added to the understandings and appreciations before the individual has the learning responses necessary for control. In most instances though more than one type of learning is involved, one type is likely to predominate. It is essential that we clearly distinguish the types of learning responses in terms of their purpose and application in the world.

Still another bad effect of confusion or failure to distinguish clearly between learning types is indicated in the following quotation from Morrison: [2]

> On the other hand, failure to note the significance of difference in types of learning and teaching very often leads to assembling incongruous elements in the same course or sequence. Perhaps our best illustration is in the field of English. In courses or parts of courses offered by the English dapartment, there are at least four different types of teaching. Grammar is a science-type subject. Literature belongs clearly to the appreciation type. Composition is a language art, and spelling is most effectively learned on pure-practice principles. Grammar is pedagogically as different from literature as is algebra different from sportsmanship. The fact that all these subjects are logically classifiable as English is of little moment in comparison with the fact that pedagogically they are of four different kindred. Further, the teacher who is well adapted to instruction in grammar is apt to be wholly unadapted to successful teaching in literature. As we shall have occasion to see later, composition as a language-arts subject is most effectively taught as a medium of expression in learning science-type subjects. Now, the effect of herding all these subjects together without discrimination is, as we have seen, to at-

[2] *Ibid.*, pp. 96 *ff.*

tempt to teach them all under the science type. The result is nonmastery and waste.

NOTE: The foregoing presents two prominent and disastrous misconceptions of learning. Instructors and students may wish to list and discuss others at this point.

Discussion Questions for Summarizing and Testing on Problem 3

1. Turn back to Question 5 in the summary list for Problem 1. Can you amplify your original answer on the basis of the reading done for this problem?

2. In all country towns there are certain individuals whose erudition is respected. They are referred to as "well posted." Sometimes these people are intelligent and successful members of the community. In many instances they are distinctly neither successful financially nor leaders in the community—but they are "well posted."

   a. What is the matter in the latter case—in terms of our present discussion?
   b. Can you describe cases from your own observation illustrating the type mentioned?

3. A bashful country boy, usually reduced to blushing and silent awkwardness in company, met an old lady whom he knew walking along the road. He surprised her by offering to carry her bundles. She replied that they were light and she was nearly home, but was surprised further to have the boy blurt out after a bit, "Please give me some of them—if only for the looks of things."

   a. What kind of learning had taken place?
   b. How, probably, had it been taught?
   c. From the evidence, do you think the learning was genuine or not?

4. In answer to a request for a school song a large city high school received a number from which to choose submitted by talented students and alumni. The committee chose an excellent one which was set to music by the music instructor. The student body, however, was not enthusiastic, voting almost unanimously for another song, cheap boasting in doggerel verse, set to jazzy music.

   a. What types of learning were evidently not well accomplished within the school? What learnings had been inculcated by influences outside the classroom?

b. What learnings, specifically, do you think need attention?
c. Are other departments involved besides English and music?

5. A father complained of his son's education, that it has not trained him to think, to do, to attack ordinary problems on his own initiative. The boy has unusually high grades, but according to the father comes to the latter for planning, for decisions, he should be making himself. When the boy asked to go to Scout Camp for a month, the father told him he could if he would plan it all out himself, putting down in writing just what equipment and clothes he would need, how much money, etc. But immediately upon arrival at camp the boy had to write for money, and practically every day wrote for items of equipment he needed.

a. Was the father partially or wholly right in criticizing what his son had been learning?
b. How do you account for the boy's high grades in the face of apparent stupidity?
c. What, in general, is the matter with the type of education given this boy?

6. Another father complains about his son's education. On quizzing the youngster he was shocked to find that the boy did not know where Yucatan is, what hemp is, where Trinidad is, how to work problems by proportion.

a. Was this father partially or wholly right in his criticism?
b. What questions might you ask the father in order to stimulate his thinking about education?
c. Could you use any of the items the father used and construct a question which would really test the boy's learning—or at least be aimed at testing it?

7. A high-school student hands in voluminous and carefully outlined reviews or reports on books assigned for outside reading. The work took a long time and was carefully done. The teacher, however, asked the student if he had gained any new ideas from the books that he might use in his everyday affairs. He asked in a kindly way just what good the lengthy reports were. The boy stared blankly and appeared disappointed in his grade.

a. What made the boy feel that such reports were the proper thing?
b. Wherein did his teacher differ from those he had had previously?
c. What is the significance of this little story for learning and teaching?

8. "The teacher should endeavor to distinguish between the attainment of knowledge and the acquisition of the symbols of knowledge." Explain and illustrate this statement at some length.

9. Duplicate the story of the boy and the Civic Code, illustrating the error of misconceiving the use and power of certain types of learning. Many simple cases can be found in everyday teaching and everyday life.

Parallel Readings for Problem 3

1. Grant, J. R., *Acquiring Skill in Teaching* (Silver, Burdett & Co., 1922), pp. 70-74. Contains interesting exercises and questions.
2. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. iii and first part of Ch. i. One of the most valuable references available.
3. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Chs. iv and v. Probably the most valuable reference on this topic. Some statements are in controversy, but general emphasis deserves careful consideration.
4. Wilson, H. B., Kyte, G. C., and Lull, H. G., *Modern Methods of Teaching* (Silver, Burdett & Co., 1924), Ch. ii. Brief, succinct statement.

PROBLEM 4

WHAT IS TEACHING?

Exploratory and Pre-Test Questions

1. What seems to you to be the essence of the procedure known as teaching?

a. Answer in general definitive terms first.
b. List some specific characteristics which will help make the nature of teaching clear.
c. What differences in procedure are implied by the terms *teaching* and *hearing lessons?*

2. Can we tell *in advance* whether or not some teaching procedures will beget learning—why or why not? That is, is there any guarantee that certain procedures are likely to be successful and others not? (Do not stop when you have said "we can tell by results" or by the past experiences of others; evolve still other answers.)

3. College professors often laugh at courses in "General Method of Teaching." Their argument in brief is, "How can you train teachers *in general?* You must train them to teach English, to teach arithmetic, or to teach in the kindergarten. How could we ever have general principles applying to such diverse things as teaching analytic geometry and teaching first-grade reading?"

On the basis of the little you have so far studied, and on the basis of your own observation, what do you think about it? Are there principles of learning and teaching that might be important at any age in any subject? If not, why not? If so, try to describe, define, or illustrate in your own words.

4. Consider two teachers, one teaching a dog to jump through a hoop, the other teaching a boy how to multiply. Grant that in each case the teaching is sound and expertly done. Wherein might principles and procedures be alike? Wherein widely different? (Complete answers are impossible at this stage. Valuable preliminary analysis can be made, however, by the student.)

5. Would it be best for an inexperienced teacher to begin by imitating an expert teacher; by studying the nature of the learn-

ing process and method principles based thereon; by beginning to teach, thus learning by experience?

6. Why do some excellent athletes, expert performers in baseball or football, make poor coaches? Why do some mediocre players make excellent coaches?

7. College professors often say, "Do not bother with courses in 'method' or 'pedagogy.' If you know your subject, you can teach it." Cite evidence from your own observation showing the truth or error in this view.

8. Some one has said, "the best teacher is she who teaches least." What does this mean? Do you agree or disagree?

9. A man "teaching" athletic teams is often called a *coach* instead of a *teacher*. What is the difference between teaching and coaching? The likeness?

10. If a teacher is concerned, not with getting a pupil to memorize, but to respond, what are some of the traditional teacher activities that should disappear? Some new ones that might be given a larger place, particularly in high school and college?

Teaching is the stimulation, guidance, direction, or encouragement of learning. It is setting the stage upon which learning takes place, it is giving opportunity for learning to arise. It is the guidance of such spontaneous learning as appears in the natural activities of children or older students. It includes all the activities performed in the direct furtherance of learning.

The words "giving opportunity for learning to arise," "stimulating," "guiding," and "directing," learning are all used advisedly. Some extremists seem to believe that learning will take place almost without teaching, without stimulation, without guidance. Let the natural impulses of children find expression, and learning will result. Learning conditions for these people are those of extreme freedom, lack of teacher participation, control, or domination. They "view with alarm" what they choose to call "teacher domination" of the learning process. They profess to believe that the teacher should never lead, direct, or domi-

nate, and state that teaching consists in taking pupil purposes, motives, activities, and procedures as guides for the development of learning. The amount of truth and error in this position is admirably illustrated by an odd mistake made by one of the extremists himself. At a recent convention of the National Education Association, this individual was vigorously advertising a sectional program, announcing repeatedly to all and sundry that the keynote and title for the sectional addresses was "Protecting the Child from Adult Interruption." This, of course, emphasizes the pet point of the extremists that the teacher should not participate materially and implies that the child freed from adult interruption will get along satisfactorily. The actual heading as it was printed on the program was (italics are mine), "Protecting the Child from *Undue* Adult Interruption." This, of course, is satisfactory to any competent individual. The adult (teacher) must participate. The danger is not adult participation but too much of it or the wrong kind—undue adult interruption. There can be no question but that the traditional recitation completely dominated by the teacher did "interrupt," if it did not in truth prohibit learning. It is easy to have so much teaching that no learning takes place. But that there must be wise stimulation and guidance is equally without question. The teacher must direct learning, but what she does to accomplish this is determined by the nature of the pupils' responses and learning processes. Teacher activity is to stimulate learning activity. The nature of learning activity in turn determines the teacher activity. Some one has well said that the task of the teacher is "to assist the pupil to do better what he will do anyway." We may even go so far as to say that in some instances at least the task of the teacher is to get the pupil to do willingly and happily what he must do anyway.

On the other hand, another group have seemed to be-

lieve that learning takes place only under the thumb of the teacher. Learning for them is directed by formula and rule. The learner is led along a clearly defined (adult defined) path to learning.

Neither extreme is reliable. There is in truth much spontaneous learning growing out of the pursuit of impulses and purposes evolved by pupils themselves. It is probably the most effective learning and should be encouraged and utilized by the teacher. The stage should be set so as to cause this pupil-initiated learning to arise—paradoxical as this may sound. On the other hand, many pupil purposes, if followed, may lead to waste of time, may interfere with real learning, may even result in highly undesirable learnings. Furthermore, it is extremely doubtful if pupil purposes and drives are either numerous enough or strong enough to carry all learners to full realization of desired ends. There must be stimulation and guidance by the teacher. Often there must be direction, and perhaps, on rare occasions, compulsion. Teaching is therefore not only utilizing the natural learning impulses and activities manifested by pupils, but it is the arousal, stimulation, and guidance of learning processes. (This will be discussed again at length in Problem 2, Unit II.)

That the responsibility of the teacher for learning is being recognized is indicated in the increasing use of diagnostic and remedial teaching (*see* Problem 4, Unit V), and by the increasing tendency to examine the teacher as well as the learner in case of failure. One city system recently changed the wording in one column of the course report blank from "Number of Pupils Who Failed," to "Number of Pupils Whom I Was Unable to Get Ready for the Next Grade." One older teacher indignantly ran her pen through the new and substituted the old wording, and reported to her superintendent that she could not be blamed if pupils did not learn. She is out of step with the

times. Granted pupils who are normal intellectually and emotionally and of reasonably normal home and social background, learning will take place if the teaching is good. To be sure, some will learn faster and more willingly than others, those who are seriously handicapped in any way will not learn, and this is not the teacher's responsibility. But if a normal child does not learn, he should not be failed; the teaching should be redirected so that he learns. Granted reasonably normal situations the key lies in the teaching.

How will the teacher know how to stimulate, direct, and guide learning? As already set forth, the teacher must know the nature of learning, the processes by which it is carried on, and must be acquainted with the nature of the learner, that is, with various fields of psychology. Unfortunately, psychology is rather badly organized and taught in most teacher-training institutions so that it has not always functioned as it should. Nevertheless, general principles of learning upon which are based general principles of teaching are derived from child psychology, adolescent psychology, the psychology of learning. Such principles are those of *general method*, which it is the aim of this volume to discuss.

The teacher must also understand the organization of subject matter and other materials of instruction. From an analysis of the problems presented in teaching specific subject matters, still other principles are derived. Many of these can be, and have been, subjected to experimental attack. From this source come principles commonly referred to as *special method*. For instance, in the process of acquiring a clear idea of what to do, whether it be writing with a pen or doing fancy diving, there will be certain *general* principles of value in both situations. There will be innumerable *special* principles and devices, peculiar to each, peculiar even to certain small parts of the two

learnings. The process of acquiring a rule whether in third-grade arithmetic or in college algebra, will be the same in *general.* But the devices, questions, problems used will be widely different, for they will be based upon the *special* requirements of the situation. In teaching children to do division when zeros are involved and in teaching high-school pupils to divide algebraic quantities, there will be a number of *general* principles equally valuable to teachers of both subjects. In addition, there will be many *specialized* procedures dependent upon the nature of the material. Courses in special method will follow such a course as you are now taking.

The complete answer to the question of sources of teacher guidance must wait, of course, upon further study, upon practice teaching, and upon experience with actual teaching. Suffice it to say here that the teacher derives guidance in the main from psychology and from experimental analyses of teaching procedures, plus practice and experience.

Is there any danger of too much reliance upon principles and upon formulas? The stimulation and guidance of learning is not a routine procedure. Slavish dependence upon "methods," sound though they may be, the mechanical repetition of devices and formulas will not beget learning. The skilled teacher adopts principles but adapts procedures based upon the principles to the subject, the class, the situation at a given time. Teaching, more than most occupations, demands the use of judgment, imagination, initiative, and enthusiasm in developing modes of procedure. Particularly does good teaching demand the use of freely working creative imagination.

Many people look upon teaching as a mechanical process easily carried on by workers of mediocre or low ability. Many individuals enter teaching as an easy mode of earning a living. It is, of course, true that many people of

extremely low ability are teaching—at least they draw salaries as teachers. Their work is, however, distinctly unsatisfactory. The profession has had to tolerate such individuals for three reasons. First, low salaries prevalent until recently would buy only that grade of ability in the main, though many people of fine ability were to be found working beside the inefficients. Second, until recently we have not had any reliable measures of teaching efficiency. Although we cannot yet measure it precisely, we can evaluate it with satisfactory accuracy. Third, the general lay public has never understood what actually constitutes good teaching. These factors have made it possible for many low-grade teachers to remain and to encourage the idea that teaching is mechanical and easy. Many beginners regard it simply as the assignment and hearing of lessons. They list patience and hard work as two chief attributes of the successful teacher. Although important, these two will by no means guarantee success. Teaching is an intricate, complex procedure, requiring high-grade mentality, ability, ingenuity, personality, and training. Although knowledge of formulas is necessary, it will not guarantee success.

Learning can only be done by the learner. No matter how correctly the teacher proceeds, no matter how earnest she may be, no matter how hard she works, it is not good teaching unless the learner is galvanized into effort and activity. Acting in accord with the soundest principles, doing the things that good teachers do, is not necessarily teaching. Getting the pupil to learn is teaching. Dewey [1] phrases it succinctly, "One might as well say he has sold when no one has bought as to say he has taught when no one has learned." It goes without saying, of course, that badly done, the activities commonly called *teaching* will inhibit, if not entirely prevent, learning.

[1] John Dewey, *How We Think* (D. C. Heath Co., 1910), p. 29.

This simple definition of teaching—the direction of learning—will be continuously elaborated throughout the volume until the student acquires understanding of the various aspects and factors involved.

Discussion Questions for Summarizing and Testing on Problem 4

1. Amplify the answers to any of the pre-test questions which were not handled satisfactorily in the original discussion.
2. Cite cases observed in real life illustrating the earnest persistent efforts of children or older students to carry on learning processes that were not initiated by others, that may even be opposed by others.
3. A professor describing one of his own class periods stated that a point in his lecture aroused immediate questions from the class. The students asked for information, began citing illustrations pro and con, arguing enthusiastically among themselves. "But," said the professor, "I soon put a stop to that! I told them if they wanted to talk, to talk to me, that I would not tolerate such discussions among members of the class." Was the professor right or wrong, partially or entirely? Organize arguments.
4. A pupil says he does not want to learn. Another says he will not learn. The teacher is the guide and director of learning, but is she concerned if there is no learning process going on to direct?
5. Many teachers, particularly in high school and college, are contemptuous of preparation. They trust to background, or to inspiration, in the conduct of their class periods. What are the dangers of such a procedure?
6. It is often said of some professor, "He is a really notable scholar—he knows his stuff, but he cannot teach." What is meant? How do you explain the situation? How can it be avoided?
7. A teacher complains that her pupils are "dumb." They answer in monosyllables, fail to prepare or to do outside reading, turn in belated and slovenly papers. The teacher is earnest, works hard, prepares carefully, asks many questions, tries to arouse interest, and enthusiasm in the pupils. It may be, of course, that she actually has a dull group. However, what other explanations might be advanced under the circumstances?
8. School superintendents often complain that they get teach-

ers of mathematics, history, or what not, who know the material from A to Z but who know little and care less about the learners. Why should there be complaint?

9. Some educationists stress the nature of the learner as the dominant factor in planning methods of teaching. Others emphasize the nature and organization of the social inheritance as the criterion of procedure. What is the real teaching problem involved?

10. Are puppies, kittens, young birds, taught by their parents or not? (The important point in this question depends upon the interpretation given to the word *taught*.)

11. Present arguments showing how much truth and how much error there is in the following statements. (Individual students are not expected to prepare more than three or four.)

a. The age and temperament of pupils determines how you should teach them.
b. Methods used in Chinese schools should be totally different from those used in our schools.
c. Methods of teaching must differ within large cities. Children from the slums cannot be taught by the same procedures as those from fine homes.
d. A teacher cannot tell how she will teach until she has met and studied her pupils.
e. The more freedom a pupil is allowed, the more he will follow his native tendencies, the longer he will stay in school, the more he will learn.
f. The teacher should utilize rivalry and emulation in teaching but must guide it carefully as it will develop into envy and jealousy.
g. "The child's mind instinctively jumps rapidly from one thought to another. The adult's mind has been trained to stay in one channel. Method should not ignore this difference."
h. "Never say, 'Work by this rule,' unless it is the pupil's rule."

12. An authority in the field of science teaching once said, "The bane of science teaching is the idea that it must be taught differently from everything else in school." What did he mean? Was he right or wrong?

Parallel Readings for Problem 4

1. Cubberley, E. P., *An Introduction to the Study of Education* (Houghton Mifflin Co., 1925), Chs. xii and xiii.
2. Foster, H. H., *Principles of Teaching in Secondary Education* (Charles Scribner's Sons, 1921), Ch. i.

3. Horn, J. L., *The American Public School* (Century Co., 1926), Ch. ii.
4. Judd, C. H., *An Introduction to the Scientific Study of Education* (Ginn & Co., 1918), Ch. xvi.
5. Kilpatrick, W. H., *Foundations of Method* (Macmillan Co., 1926), Chs. i, vi, vii.

Note: Since this volume is written for the beginner and the student in training the bibliographies throughout are selected and not comprehensive. Effort has been made to include easily accessible, well written discussions. Instructors will doubtless wish to add others. The exhaustive bibliography necessary for the advanced student in the field, and which was utilized in constructing the volume is not necessary here and no effort has been made to provide it.

Discussion Questions for Summarizing and Testing on Unit 1

The desired product of learning is not mere memorization of facts but the acquisition of responses based upon understandings and attitudes; the development of mental and motor skills. In testing your learning derived from this unit, effort has been made to avoid tests of information only. Such tests are sometimes necessary but are not included in the lists of discussion questions since the instructor can easily devise true-false, completion, or best-answer tests that will serve satisfactorily as fact tests.

Conclusive test of your ability to use the understandings derived from this unit will doubtless have to wait upon practice teaching. The questions at the close of each problem in the unit are attempts to supply tests that will supply symptomatic evidence of your understanding. The instructor will doubtless devise others of similar nature. He may ask you at this point to go back and amplify any answers previously made which were not satisfactory, to take up questions which were omitted the first time. The following additional problems are sugggested:

1. You have now studied a considerable amount of text material, you have read supplementary references, you have discussed all this, you have written papers and answered questions. You

are now asked to boil down the results of all this diverse activity to a brief paragraph not exceeding a dozen sentences. Can you think out the major ideas to be derived from this unit and state them in a few sentences?

2. What skills and abilities have you had to use in studying this unit yourself, which should be of value to you in future studying? Of value to you in guiding the studying of others?

3. Can you devise a hypothetical situation or case which would test a student's real understanding of this unit? (This is one of the most difficult questions in the book. It cannot be answered quickly or easily. Many students will not be able to answer at all but every one should try.)

4. How will it affect learning if pupils are never given a chance to express or apply when they learn?

5. A teacher has a wide reputation because of the interest and enthusiasm of her pupils; their perfect behavior in her room; their obvious ability to manipulate the materials of instruction. But on leaving her class they behave much like the rest of the pupils, participating in disorder and manufacturing some themselves. They do not pay attention to the new teacher, do not seem to know anything, do not know how to study, or attack assignments. Assume that the new teacher who receives the pupils is a good teacher.

a. What did the first teacher probably substitute for teaching?
b. Could she have been entirely ignorant of her error?
c. What learnings were actually being acquired?
d. What learnings, in general, were being neglected?
e. What would likely be the effect on future learnings?

UNIT II

GENERAL CONSIDERATIONS AFFECTING ANY TYPE OF LEARNING

As indicated in Unit I there are certain phases or types of learning that result in the acquisition of various forms of response. Before proceeding to a detailed discussion of the direction of these learning types it will be well to discuss a number of characteristics of learning in general, factors that affect any and all types of learning.

PROBLEM 1

IS LEARNING EITHER WHOLLY ACTIVE, WHOLLY PASSIVE, OR PARTIALLY BOTH?

Exploratory and Pre-Test Questions

1. Should students prepare their lessons together? Why, or why not? (Consider such matters as specific pupil activity desired, contrast personal stimulus and personal dominance, effect of expression and argument on thought, social interests involved and their effect, etc.)

2. Evaluate ordinary parental assistance given to pupils on their "home work," from the standpoint of its effect, ordinarily, on learning.

3. Are pupils ever inactive? Are there times when they are learning nothing at all? If you say "No" to the last question, tell what pupils are learning when seemingly "dead to the world," "inattentive," "day-dreaming," "wool-gathering."

4. Should a teacher ever accept imperfect work from pupils? Ever deliberately allow them to make mistakes? Ever prevent mistakes? (Look for arguments on both sides, and try to resolve any contradiction you find.)

5. Can you imagine a shop or laboratory situation in which pupils were active—moving about, handling materials, actually making things—but in which no *activity* in the educative sense was taking place? Answer "yes" or "no," and support your answer. This is an important test of your observation and ability to analyze.

6. What effect will the teacher's *tempo* have on pupils' activity? The quick teacher on the quick pupil, the slow pupil? The slow teacher on the quick pupil, the slow pupil?

7. "There is a time to tell and a time to refrain from telling." Does this seem to indicate the possibility of passive learning, or is there another interpretation?

8. A lower-grade geography class got into a heated argument as to the specific conditions which brought rain in their locality.

The teacher suggested that they write to the local weather bureau to find out.

a. Was this an occasion to "tell or refrain from telling"?
b. If the teacher should have given the information, tell why?
c. If she did the right thing, show why?

A baby learns to walk by actually trying to walk. No amount of demonstration or discussion will enable him to do it. He must do it himself in order to learn. The principle of self-activity states that the learner learns by doing. This is a primary principle of learning. It is the opposite of what might be called the *doctrine of receptivity*. Education for long has been carried on as if the pupil passively absorbed what was put before him to be learned, as if he had education poured into him, as if he *received* his education. We cannot *give* any one an education; he must *get* it.

Teacher activity must stimulate proper pupil activity, or the teaching is fruitless. Of course, individuals while awake are never inactive—despite outward appearances at times! If students are not engaged in the activity the teacher desires, they are certainly engaged in some other. Sometimes the surreptitious or forbidden activity is more educative than not, if the teacher is poor, slow, or dull herself. Too often, of course, the hidden activity is detrimental to the desired learning and begets undesirable learning. It is the task of the teacher not only to stimulate educative activity, but to prevent undesirable activity.

Despite its basic nature the principle of self-activity is often violated. In the first place, it is always easier to do a thing than to get it done. The impatient teacher often tells or does too much, mistaking acquiescence for acquisition. A second violation involves the opposite error, telling so little, doing so little, moving so slowly that the children cannot start, and, if they do, they soon weary and digress upon activities of their own choosing. A third

violation is a partial one, in that all pupils are not included in the activity. Even good teachers often allow the few bright and aggressive pupils to do most of the work rather than labor with the slow or dull ones to bring them into the game. Rigidly refraining from doing the work, making sure that enough demonstration or direction has been given, at the same time distributing opportunities for participation, are necessary teaching procedures. In fact, efforts are often made to evaluate lessons by measuring objectively the relative amount of pupil and teacher activity. Stopwatches are used, questions and answers counted, number of words used by each pupil are counted, etc., in an effort to determine the worth of the lesson. Many other factors must be considered, of course, but such efforts are valuable in that they focus attention on the value and necessity of pupil activity.

Activity involving motor responses. In learning involving objective manipulation and bodily activity, the principle would seem to be more obvious than in learning involving inner or mental response. Nevertheless violations are fairly common. The active, quick-moving teacher is apt to take a piece of paper cutting out of a child's hand to demonstrate and proceed to do a large share of the little exercise. The water-color enthusiast often loses patience with a slow pupil and paints most of the picture. Even where the actual work is not done by the teacher, the directions are sometimes so exact and minute that there is little independent activity left for the pupil. Many high-school shop teachers report that typewritten sheets are handed to them by the principal or department head giving explicit directions for the work to be done. Often these sheets are given out a day in advance and sometimes on the day the work is to be done. In such a situation there can be neither real learning activity, nor even any teaching activity worthy of the name. Many laboratory

manuals *instruct* the learner so carefully that he cannot *learn!*

It is relatively easy for the teacher to observe directly and see if proper motor activity is taking place. If a pupil handles a saw or a pen incorrectly, the wrong activity is apparent, and teaching can enter to guide the learner toward correct responses.

Activity involving mental responses. The stimulation of real activity in perceiving, thinking, and understanding is much more difficult than in the case of motor learning. One of the most difficult problems for the beginning teacher is the determination of how much real mental activity has actually taken place in the mind of the pupil. This remains a problem for many teachers and constitutes one of the chief defects of teaching. The teacher must acquire a concrete understanding of psychological processes, and know how to check upon them. Many children, and older students as well, acquire the ability to talk fluently in class, thus convincing the casual observer that some excellent learning was taking place. An interpretative question or two, a call for implications, will reveal in some cases that the pupil has no real understanding of the matter discussed. The skilled teacher becomes expert in inferring the "inside" facts from observation of the pupil's behavior or words. She infers what is happening in the student's mind and is able to determine what question to ask, what illustration to give, what criticism to make. Additional light will be thrown upon these matters in later discussion in this volume.

It is to be emphasized that activity of the mental type, particularly in thinking, takes time. It is difficult for the quick, nervous teacher to wait for answers from a silent and seemingly inactive class, but she must do it. Teachers who take sentences out of the mouths of pupils soon discourage attempts to answer. A well-known college pro-

fessor is said never to have allowed a student in his classes to finish a sentence. He seizes their first words and rushes off into an answer himself. The student body has built up a technique consisting in starting likely sounding sentences using the professor's terminology, knowing that no student will ever have to finish what he is saying. Certain commercial teachers harp constantly on the making of quick decisions, insisting that business men are noted for ability to think quickly and accurately. Consequently, they drive their classes in an effort to force rapid response. These teachers lack understanding of the psychology of thought and habit formation. The ability to think quickly and accurately is the product of a long period of practice, experimentation, trial and error, etc. As stated above, the fast teacher preventing the completion of activity, discourages the slow pupil. On the other hand, the teacher who is too slow will find the bright pupils completing the activity she desires, getting tired of waiting for her, and going off on devices of their own. In this point we have the best answer to the statement sometimes made that the slow, plodding learner makes the best teacher. The slow, plodding teacher may be an expert with the same type of learner. She cannot teach bright pupils at all, let alone do it better than a quick thinker.

It is a temptation sometimes to devote considerable time to one pupil in order to get him to participate. Many teachers think it an index of pedagogical skill to pursue a pupil with a series of questions while he struggles with a difficult thought process. This is legitimate when the majority of the class is having the same difficulty as the pupil reciting, but it is a serious error when most of the students are eager to answer. The pupil on the floor is likely to become more and more embarrassed and confused, utterly unable to respond. Activity is completely inhibited by the teacher. Even in cases where this pro-

cedure is proper, the teacher should be on the alert to observe the point at which the law of diminishing returns enters the pupil activity. Keeping the class above this point is an index of skillful questioning. The special difficulties of the few slow pupils are problems for supervised study periods and should not be allowed to waste time for the whole class.

Classroom tempo and activity. As has been indicated in the foregoing pages, the pace of the teacher vitally affects the learning activity. A fast pace holds the brighter pupils but confuses and eventually discourages the slower learners. A slow pace is well suited to the slower learners but begets inattention and disorder among the faster pupils.

Tempo may also be considered from the angle of the material being used. Ordinarily factual material and drill processes may proceed rapidly. Material developed through thought or appreciation should be handled slowly.

This problem of tempo has been overlooked in most discussions of teaching, and yet it is so fundamental that it can make or break a given teaching procedure or even a given teacher. The problem is to choose and adjust the pace or paces within the class hour so that the quick students are kept on the alert and so that the slower ones are not lost or discouraged. Sometimes this calls for a reorganization of the teacher's personality traits and tendencies. The quick thinker is likely to be impatient with the slow and to proceed at her own pace. The slow teacher is likely to be bewildered by the faster students and lose control of the situation.

Utilizing spontaneous activity. Not all educative activity has to be stimulated by the teacher. Sometimes other elements in the environment, or the pupils' own desires and abilities, bring it forth. Even on the upper levels, the supposedly blasé college student is often eager to carry on individual and voluntary projects, to do extra work

The college "honors" courses are quite largely the outgrowth of such spontaneous and self-initiated learning activity. Similar situations exist in the elementary and secondary schools. In fact, one of the greatest modern reforms in elementary teaching is directed at utilizing the spontaneous and natural activities of children.

Even that activity manifested in opposition to the wishes of teacher and welfare of school can be directed to pedagogical ends. A great cartoonist, known to all Americans to-day, was soundly thrashed almost every day in rural school because he persisted in drawing cartoons for the amusement of the other children. The school did its best to destroy the educative activity that later made the boy famous. Such pupil activity can be used in making blackboard illustrations, posters, placards, etc. The small boy or college sophomore who creates an uproar by facial contortions, wiggling his ears, or appearing in a battered derby hat, can be made an ally and exponent of good order if his talents are utilized in dramatics. He is not only removed as a disturbance, but his activity becomes highly educative.

Some waste activity necessary. It was noted above that the impatient teacher often inhibits activity, either by doing the work or finishing the thinking in which the learner is engaged. Sometimes the teacher is not merely impatient, but dislikes mistakes, absurd inferences, crude imperfect drawings, bungled pieces of construction. She wants perfect results only, and to get them she stunts the learning process. *She gets results but no learning!* In either case a fundamental in learning is being overlooked, namely, that mistakes are necessary, that experimentation is essential, that trial and error is inevitable; that all these are highly educative. Of course, long-continued, wasteful, costly, or dangerous blundering must be eliminated. The skillful teacher will recognize the situation in which the

pupil is no longer learning through his mistakes and step in with assistance. But much "scrapped" thought, erroneous thought process, imperfect work, is necessary and valuable.

Self-control, self-restraint, and inhibition of movement, as forms of activity. The following quotation calls attention to a phase of self-activity that is often overlooked: [1]

> Finally, activity may as well result in the inhibition as in the production of ideas and feelings and movements. A fifth-grade schoolroom in which the children sit quietly reading or move about in a businesslike way may represent more real activity than a room in which the children are waving their hands, incessantly making comments and asking questions. The first room may, it is true, represent mere repression and absence of interest and work; but it may represent thought, interest, and work, *plus the inhibition of aimless expressions thereof*. It must not be forgotten that *not* to think the foolish, irrelevant thought is the essential of reasoning; that *not* to follow the wrong impulse is the essential of character; that *not* to make the aimless and crude movement is the essential of skill. Success is in great measure not making failures. What a man does depends upon what impulses are neglected or overcome. We are what we are by reason of what we are not—what we do not permit ourselves to become. Activity is inhibitory as well as impulsive.

Thorndike's remarks do not imply that the teacher must restrain and control. The pupils must be allowed a certain amount of experimentation and trial and error in order to learn self-control and self-restraint. The teacher will interfere, of course, when there is possibility of wasteful or disastrous error.

Activity as direct and as vicarious experience. It is often said that we can learn only by experience. An old proverb has it that "experience is the best teacher." The foregoing discussion of learning as activity would seem

[1] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler, 1906) p. 41.

to bear this out. However, the average citizen overlooks an important phase of activity, namely, inner or mental activity. Hence his limited common-sense interpretation of the proverb is wrong. We do not learn only by *direct* experience, by doing the thing ourselves. *Direct* experience is not always the best teacher; it is often a poor and wasteful teacher. We do unquestionably learn an immense amount through activity of the *direct* experiencing type, but we can learn also through the experience of others. We can save ourselves long laborious processes of discovery, we can avoid errors and delays through *vicariously* experiencing the *direct* experience of others. We can appropriate ideas, understandings, attitudes, can even cut down materially the time and labor necessary to acquire a motor skill by observing others, by reading, by dramatizing, by pondering and reflecting upon the experiences of others. The responses of reading, dramatizing, perceiving, thinking are truly activities of an educative type and are forms of experiencing.

One can "experience" the first meeting of the Continental Congress, the storming of the Bastille, the westward march of the Pioneers *vicariously* through reading, reflecting, or dramatizing. This *vicarious* experience must be a truly active process, the learner must re-live the events. He must *hear* the tramp of the rabble on the cobblestones of Paris, must *see* the light in old South Church, must *thrill* with Lewis and Clark at sight of the Pacific. "I do not like it," said the little Scotch girl with flashing eyes, "when the book says, 'The Picts and Scots were driven back'." Is it real to her, is she experiencing and learning? And what of the boy who suddenly shouts out in the midst of a silent reading period, "Gee! Wasn't Richard the Lion Heart a peach of a guy?"

It goes without saying that merely to read passively, to be able to answer memory questions, is no guarantee that

the learner has appropriated the ideas, understandings, and attitudes attached to the orginal experiences. Merely to go through the motions is not to have the experience.

By means of *vicarious* experience the learner can not only experience the dead past, but he can have an immensely wider range of experience with the present than would ever be possible through *direct* first-hand experience. Compare, for instance, the "experience," direct and vicarious, of a high-school boy pursuing the rich curriculum of a modern city high school with the "experience" of a forty-year-old individual who has lived his entire life in an isolated backwoods village. The latter will, of course, have many responses that the boy will not, but the boy's sum total of learned response, his *experience,* will be immensely greater. We often hear adults repress young people with the remarks, "When you are as old as I am . . . ," "When you have had as much *experience* as I have had. . . ." There is no guarantee whatever that mere years of existence are years of experience, that they beget superior wisdom. The kind of experience with which the years have been filled is vital. The reactions of the "experiencer" are vital. The analysis of experience is often more important than the experience. Many people who claim "twenty years of experience" have often had but one year's experience repeated twenty times. Theirs is the repetition of narrow limited direct experience unleavened by reading or thinking—by vicarious experience.

As noted above there is grave danger that vicarious experience be not experience at all but merely going through the motions. When mere memory, bookishness apart from understanding, when repeating the words instead of reliving the actions, is rewarded, there results that situation which has aroused the antagonism and suspicion of the average citizen toward "book learning." Book learning is susceptible to grave misuse. Desired results are

easily missed. But, properly handled by an expert teacher, and with competent learners, books are among the most important vehicles of experience ever discovered. They are factors in learning activity. When books fail to beget learning, it is to be sure often the fault of the book. Very often, however, it is the fault of the teacher or of the learner. A "book-learned fool" is not so because he is book learned but because he was a fool in the first place.

Discussion Questions for Summarizing and Testing on Problem 1

The foregoing is a brief account of the doctrine of self-activity. Other problems remain. How to initiate and maintain educative self-activity? How to utilize the pupil's own responses? How to stimulate bright and dull to activity? After discussion of the following summary questions, we will proceed to such problems as are necessary to a further understanding of the stimulation of educative activity.

1. A certain state superintendent of schools once said, "It is now 2:30 P.M. All over this state the fourth-grade children are working the exercises on page so-and-so of their hygiene primers." Analyze and interpret the superintendent's views of learning in terms of what you know of learning activity.

2. A primary teacher believes in stimulating children to initiate and follow out their own activities. The room is always busy, pupils are doing things, artistic and utilitarian construction seem always to be under way. There seems to be little teacher domination. But teachers who receive these pupils in later grades complain about their habits of work. A visitor once asked a boy who was energetically nailing boards together what he was making. The reply was, "I'm just pounding."

   a. Is there any key in his reply to the probable cause of the difficulties encountered by other teachers with these pupils?
   b. Summarize clearly the good and poor procedures and ideas this teacher was evidently trying to carry out.

3. What is the significance of the word *self* in the doctrine of self-activity?

4. How can you determine whether activity of the inner or mental sort has actually taken place? Make a list of at least five specific indications.

5. Make a fairly long list of specific ways in which a teacher may violate the doctrine of self-activity in (*a*) teaching a motor skill, (*b*) guiding a problem-solving exercise, (*c*) in developing emotional sets, attitudes, ideals.

6. Make a similar list of devices by which she could stimulate real self-activity.

7. Can you suggest any other *objective* standard for determining the relative amounts of teacher and pupil activity, than those mentioned in the text?

8. Thorndike says, "Activity is inhibitory as well as impulsive." Can you explain this psychologically in some detail?

Observation Exercise for Problem 1

At this point arises the first opportunity to observe the actual operation of the things you have been reading about. An excellent test of your understanding of the ideas in Problem 1 will be to try to identify them in the classroom. It is possible to see the teacher arousing, stimulating, or repressing self-activity. Certain observable items are fairly reliable indices. How can we decide whether teaching is on the level of compulsion, of teacher domination, of pupil purpose? Observe a class upon any level from kindergarten to college and make a record in terms of the following guide questions. Analyze your record in an effort to determine whether the teaching was good, in so far as it related to self-activity.

Teacher Activity

1. Is the teacher active and alert, at the same time keeping her hands off pupils' work? Does she stimulate and guide motor activity without dominating it?

2. Do her questions stimulate real mental activity, or call merely for repetition or guessing? Does she avoid answering her own questions?

3. Does she allow time for mental activity to take place?

4. In both motor and mental activity does she allow for experiments, mistakes, misstatements? Does she stimulate and allow self-correction?

5. Does she take advantage of the spontaneous activity of pupils, or does she neglect and discourage it?

6. Do her efforts make in the end for independent and intelligent self-activity in the pupils, or for dependence on an outsider to start and keep them going?

Pupil Activity

1. Do the pupils manifest a real and aggressive interest in their work, or do they seem apathetic, even repressed? Go about their work with a minimum of direction or wait to be told just what to do? Follow simple directions, and do what is needed without asking needless questions?

2. Are they orderly and systematic, though enthusiastic and hearty?

3. Do they voluntarily use books, maps, other people, in order to obtain more information? Do they use these sources intelligently and independently?

4. Do they suggest things to do, ways to do them, new sources of information? Do they try out suggestions, aid each other, work together?

5. Do they take advantage of the opportunity to work independently without abusing the privilege?

6. Do they argue, discuss, ask questions, make contributions freely and confidently?

7. Do they manifest a growing power to refrain from irrelevant suggestions and disconnected remarks? To catch their own mistakes? Avoid making the same mistake over again?

8. Does their activity in the classroom compare favorably with their activity on the playground as to freedom, interest manifested, and continuity?

9. Do their activities seem to be leading toward independence, self-reliance and initiative, coupled with proper respect for verification and good authority?

Parallel Readings for Problem 1

1. Bagley, W. C., and Keith, J. A. H., *An Introduction to Education* (Macmillan Co., 1924), pp. 37 and 43-48. Good discussion of vicarious experience.
2. Foster, H. H., *Principles of Teaching in Secondary Education* (Charles Scribner's Sons, 1921), p. 53. A note on tempo.

3. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915; revised, 1920), Ch. xii.
4. ———, *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919), Ch. vi.
5. Thorndike, E. L., *Principles of Teaching* (A. G. Seiler Co., 1906), pp. 39-41.

PROBLEM 2

HOW MAY EDUCATIVE SELF-ACTIVITY BE INITIATED AND MAINTAINED?

Exploratory and Pre-Test Questions

NOTE: The instructor is urged to organize on the board a list of basic points as they are advanced by the students in discussing the first five questions. After the fifth question the list can be arranged more coherently and such technical terms given as the instructor deems necessary.

1. If sonny receives a mechanical train or mechanical set for Christmas he will not get to use it much on Christmas because dad will be monopolizing it. Why does he become absorbed in and play seriously with the youngster's toys?

2. Adults will struggle with crossword puzzles, mazes, or what not. They become interested, throw themselves into it, work for hours. Obviously, there is no important result involved, there is "no point" to it. Why do they do it?

3. Men go exploring to the North Pole or Central Africa in the face of suffering, hardship, and most serious dangers. In Arctic exploration there is probably no commercial or other material advantage. They just do it and enjoy it. Why?

4. Men of affairs, too busy to grant you an interview or to attend properly to some important details will stop and watch a tire being changed, an excavation being dug, a minor street accident, etc. Why?

5. If a family tried to hand down to a high-school or college student an outworn and dilapidated family auto and told them it was the best they could have, the youngsters would refuse to be seen in it. And yet the "collegiate" car is the rage and students insist on having such cars in preference to better ones. Why?

It seems then that people will do things that are hard, unpleasant, dangerous; things which are not what would be expected, things seemingly with "no point." Students often say that school work has "no point," that it is hard and not worth doing. Could

they be induced to put as much effort into school work as they willingly put into other things equally without point?

There are other factors that will contribute to securing educative self-activity than those derived from a consideration of the above questions.

6. Show how abundant physical vitality (energy, "pep") on the part of the teacher may contribute interests to recitations.

7. Decide just what you mean by *enthusiasm* and then suggest possibilities and limitations of cultivating an enthusiastic teacher personality under the following headings:

a. As a matter of general emotional tone.
b. As a matter of intensive specialization on a subject, as, for instance, ancient history, community civics, botany, advantages and dangers.
c. As a series of standardized stunts like those of an actor or orator: consider their effectiveness, sincerity, and monotony.

8. Does the fact that informal recitations seem more lively and entertaining indicate necessarily superior interest if we conceive of interest as an active reaching out after more of the subject? Try to describe illustrations of informality and formality desirable in order to achieve (*a*) interest, (*b*) definite progress in the subject, (*c*) maintenance of authority.

Up to this point we have assumed that a pupil must be interested—that he must be motivated. He could on the other hand be put through the material whether he liked it or not. He could be *required* or *driven* to get his work instead of *motivated*.

9. Shall there be, then, no work done by a pupil unless he is interested and willing?

10. Does not the overcoming of hard, unpleasant, distasteful, difficulties furnish valuable educative training? (Consider real achievement in the world of affairs in answering this question.)

11. What is the relation of interest, difficulty, and unpleasantness to each other, and to learning?

12. Summarizing then: Why is it better that pupils be interested in what they are to learn? (You will probably have to cite personal experience here together with what you have learned from the foregoing questions.)

A technical point remains which the following questions may help to clear up. If not, consult the text or any good psychology.

13. It is possible to clean a room or press a suit and at the same time be turning over some problem in the mind. A well-known bandsman can play a concert entirely through without mistakes and at the same time read a magazine propped on his music rack. Is it not possible then to listen to a professor's lecture or to a class discussion and at the same time be watching something outside the window or be thinking of some problem concerning your everyday affairs?

14. People often look at a watch and then cannot tell you the time. People wind a watch or lock a door and then cannot be sure that they did until they look to see. Describe the psychology of this as best you can in your own words. Relate it to the present discussion of interest and learning.

15. A co-ed came to her room with a card of large hairpins (this was long ago), several pins to a card, priced at a nickel per pin. Her roommate needing a couple said she would take two, "How much are they—two for a dime?" holding out a dime. "No," said the other, "they are a nickel apiece." The purchaser put away her dime and dug up two nickels before either noticed and laughed. Explain the psychology of this in your own terms. Relate it to our present discussion.

Everybody has had the experience of trying to read a newspaper and at the same time listen to conversation going on among the rest of the family. One understands neither the material in the paper nor the conversation. A pupil who is studying his book and at the same time thinking of the ball game that is to take place after school, neither learns much from the book, nor plans well for the game. No argument is necessary to support the contention that learning takes place best under conditions of clear undivided attention. The forced and divided attention given in response to demands from the teacher, tapping on the table, fear of punishment, etc., is not effective for learning.

The words *interest* and *attention* are used interchangeably by many teachers, and with others there is confusion

as to definition and sequence. Technical definitions are not necessary for our purposes. Briefly, we may define interest as an *emotional* state of liking for, desire for, tendency toward an object or process. Attention connotes an *intellectual* activity exercised upon any object which may or may not prove interesting. *Spontaneous* attention and interest are two names for practically the same thing. The things we are interested in are those that attract our spontaneous attention. We may spontaneously attend to things instinctively or because we have built up habitual interests in them. The teacher who said, "I know I could interest my class if they would only pay attention," overlooked spontaneous attention and was relying on *voluntary* attention as a starter. *Voluntary* attention precedes interest instead of following it as popularly believed. We attend voluntarily to things long enough to discover they are of use to us, or otherwise vitally concern us. If they do not concern us, we shall not develop much interest. Sometimes compulsion of attention is justifiable in the hope that voluntary attention and interest may develop. This should be used as a last resort and only when the teacher is reasonably sure that genuine interest will develop. After interest has developed in anything through attention, it sustains attention which is a primary condition of learning.

The teacher's problem is to get interest, either that type which is equivalent to attention, or such degree of voluntary attention that interest will develop and maintain attention. That is, a motive or drive must be aroused in the learner, or one already existing must be seized and put to work. There is much argument about the legitimacy of "motivating" or supplying motives to students. Some say that "supplying motives" is a contradiction in terms, that we can only use the motives the learner brings. Some extremists go so far as to pronounce and attempt to practice

the doctrine that all learning should wait upon a pupil-initiated interest. Most of the enthusiasts for such a doctrine are uncritical, careless thinkers, who do not really understand the words of the prophets of the new freedom in the classroom. For instance, a large number of kindergarten and elementary-school teachers somewhat vociferously quote Dewey and Kilpatrick as advocating the literal application of the doctrine above, namely, that only pupil-discovered, initiated, and planned activity is valuable. In this connection, let us examine Kilpatrick's [1] exact words. In his very earliest discussion, he says:

> This is not to say that every purpose is good nor that the child is a suitable judge between purposes nor that he is never to be forced to act against a purpose which he entertains. We contemplate no scheme of subordination of teacher or school to childish whim; but we do mean that any plan of educational procedure which does not aim consciously and insistently at securing and utilizing vigorous purposing on the part of the pupils is founded essentially on an ineffective and unfruitful basis.

In a later [2] discussion there occur such sentences as these:

> If you stress child decisions so much, why have a teacher? Have you left any place for the teacher?
>
> I most certainly do have a place for the teacher, a definite and an abiding place. The teacher guides, first in the making of choices, and second in the pursuit of same. If need be, the teacher will command or refuse as occasion demands. But stimulation and guidance are the teacher's most constructive functions. . . .
>
> Then the suggestion might come from the teacher and the child still purpose the matter in the sense you most wish?
>
> Quite so. We have so far not based any argument on the child's originating or even selecting (in the sense of his deciding) what

[1] W. H. Kilpatrick, *The Project Method,* Teachers College Bulletin, Tenth Series, No. 3, October 12, 1918, p. 12.

[2] From W. H. Kilpatrick, *Foundations of Method* (1926), pp. 151, 154, 207. By permission of The Macmillan Company, publishers.

is to be done. So far, all that we have claimed will be met, if the child whole-heartedly accepts and adopts the teacher's suggestion. . . .

What I essentially seek is not that the child shall do what he wishes, but that he shall wish what he does.

Kilpatrick [3] is evidently aware of the misinterpretations advanced by some untrained teachers, and answers them thus:

Did I ever tell you to use nothing but child purposes? Did I ever say you must not use other ways of dealing with children?

That's what I have understood. You have advocated purposeful activity and you have decried coercion and punishment. What else am I to understand?

I am very glad you have brought this out, because I do not wish to be misunderstood and apparently I have been. What I have said I still say. Purposeful activity furnishes better learning conditions than coercion—better for the primary learnings, better for associate and concomitant learnings. But I have never said you can get purposeful activity just by wishing it or by decreeing it. If you have the purpose working with you or if you can get it, then you will get better learning. If not, then you must do the best you can, taking everything into account.

The same general point is made by Bagley: [4]

Another point for consideration is the origin of purposes. Some have feared that we call upon the teacher to wait for a move from the child. This is wrong. The point of view here presented does not demand any particular origin of the suggested purpose; either the child or the teacher may originate the suggestion. The essential point is that while the activity is in process the child or children so feel the purpose that it operates as an inner urge to define the end, guide the pursuit, and supply the drive. Whether the teacher shall or shall not suggest the purpose is a practical matter to be decided in the light of all the consequences, including among others the degree to which the suggestion may actually enlist the purpose of the child or children.

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[3] *Ibid.*, p. 350.

[4] In "Dangers and Difficulties of the Project Method and How to Overcome Them: A Symposium," *Teachers College Record,* Vol. 22, No. 4, pp. 283-321.

One of the teacher's chief tasks is to get the pupil to do willingly and happily what he must do anyway. Some people object to the word *must,* but that term could be softened without losing the point. The pupil who is interested is motivated. He desires to learn. The will to learn is an extremely valuable aid in learning. Needless to say there is much self-motivated learning. Needless to say the learner must accept and make his own many motives or drives that are to carry him to learning. The teacher, however, need not interrupt her work to debate academically the philosophical meaning of *motive.* Teachers can, do, and should supply motives or drives for the learner. Just how well this can be done is illustrated by the story about a famous professor of a past generation. This scholar taught Hebrew and to the astonishment of every one large numbers of undergraduates took the course as an elective! There was comment and curiosity as to why these students voluntarily took this difficult subject for which there would seem to be little "practical" use. The conduct of the course was such that the dilettante did not survive. Here was no snap course, haven of the seeker for easy credit. Those taking the course had to perform the arduous tasks incident to actually learning Hebrew. This they did not only satisfactorily but willing and happily. An undergraduate explained the situation in a remark which has survived as one of the many tributes to the power of this teacher, "Old Doctor H—— teaches Hebrew as if it were a series of hairbreadth escapes!" That is, he attracted, interested, and motivated the learners so that they willingly undertook severe tasks, throwing themselves whole-heartedly into them. All too often, even with subject matter much more adaptable to the learner, we fail to attract, interest, or motivate. Too often we teach a series of hairbreadth escapes as if it were Hebrew.

Violent arguments have raged regarding the legitimacy

of different methods of securing interest. At one end of the scale is the headmaster who recommends a certain type of classical private school because in such schools there is no "toadying to interest, no pampering of the learner, who is assigned definite, dull, distasteful tasks in order that he may develop mental and moral fiber." As Mr. Dooley says, "It don't make no difference what you eddicate a boy with so long as he don't like it." A good answer to the doctrine of difficulty in education is found in Hall-Quest: [5]

> One hears it frequently said . . . that the pupil must rely upon himself. Grappling with a problem until eventually he solves it gives the pupil confidence and ambition. "It makes him think." It happens only too frequently that travelers in a new country lose their way. They know many things about traveling. By tedious, arduous, discouraging, and perhaps injurious attempts they eventually may find familiar paths and havens. Doubtless they did considerable thinking, and their satisfaction upon at last finding the right way was, of course, a natural state of feeling. But would it not have been better never to have lost the path? If the pupils' power to think depends on tedious, prolonged and all too frequently unsuccessful effort, then it is small wonder that so few high-school pupils think—nay more—it is the possible explanation of the dearth of thinking among the masses. The doctrine of difficulty has its martyr-host as numerous and pathetic as the victims of untested opinion and ideas in religion and government. The learning process is difficult enough without putting a special premium on difficulties.
>
> Advocates of the strenuous life in education at times seem to ignore the fact that effort for its own sake is sheer waste. Effort is a means, not an end. The automobile stalled in a mudhole will grumble and roar and pull. There is effort a-plenty and there is a waste of "gas," tires, nerves, time, and good disposition as well. But direct this effort by chains, boards, or special devices for overcoming such mishaps, and effort proves successful.

Hall-Quest is speaking principally of the difficulty of the undirected study process, but his remarks apply equally

[5] From A. L. Hall-Quest, *Supervised Study* (1916), pp. 17-18. By permission of The Macmillan Company, publishers.

well to interest. His remarks are opinion, of course, but the opinion is based upon sound psychological theory and is supported in considerable measure by statistical data derived from supervised-study experiments.

We need fear no weakening effects upon the child merely because work is made interesting, and, furthermore, it is to be pointed out to the advocates of difficulty that difficulty and interest often go together. The advocates of difficult, distasteful learning say that such procedure is necessary to train the learner to tackle the difficult and distasteful in real life. Life is not made up, say these schoolmasters, of interesting, attractive, "motivated" undertakings. This is quite true, but their inference is incorrect. It is the learner brought up on uninteresting difficulties who will shy more and more from the same things in life because he is sick of them. The learner who has been trained to see reasons for doing the difficult, who has developed habits of interest in difficulties, will be able to attack these difficulties because his training has taught him that such things are worth doing. Both child and adult engage in most difficult tasks calling forth every energy and resource and are at the same time intensely interested. The very efficacy of difficulty, if there be such, will be enhanced because of the clear attention resulting from interest. There is far more danger of a child's acquiring a distaste for thinking and working because of the lack of interesting opportunities of expression than because of such opportunities. Developing interest is not at all what is commonly meant by "making a subject interesting." Interesting is not the same as easy. Thorndike [6] summarizes the point succinctly:

> The problem of interest in teaching is not whether children shall learn with interest or without it; they never learn without it; but what kind of interest it shall be; from what the interest

[6] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler, 1906), pp. 54-55.

shall be derived. There need be no quarrel between those who say all work should be made interesting and those who say all proper work should be done whether it is interesting or not. For both statements are true. The actual difference of opinion is about whether we should in large measure derive interests in school work from the common instinctive interests in play, action, novelty, emulation, and the like, or should derive them from the abstract and rare interests in duty and knowledge. The latter interests are the higher, and if they are present it is well to appeal to them. But in actual school work the choice is commonly not between the common instinctive interests and these higher ones,—not between, for instance, curiosity and love of pure truth,—but between one common interest and another, between, for instance, curiosity and fear of punishment.

At the other end of the scale is the half-trained pedagogue who believes that the pupil should do nothing in which he is not interested, typified by the institute speaker who made the ill-chosen remark that "any method of securing interest, even a dog fight, is legitimate." This idea of interest is just as incorrect and dangerous as is the other extreme noted above.

Parker,[7] in his texts on method, takes the bull by the horns and sets forth logically and emphatically that the so-called "sugar-coating" to secure interest is not a namby-pamby procedure as many think, but, properly applied, is a coldly scientific efficiency measure. Such sugar-coating directs the undivided attention just where it is wanted, upon the material to be learned. No one is more fully aware than Parker, however, of the abuses that have led to widespread criticism. He cites the case of the children who became so interested in the fireworks and squirting water incident to a demonstration of volcanoes and geysers that they no longer cared for the prosaic bays, maps, capes, and mountain ranges. Interest-getting devices should empha-

[7] S. C. Parker, *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919), pp. 205-208. See the same author's book on high-school methods, pp. 337-340.

size clearly and distinctly the nature of the thing to be learned and should not partake of the nature of vaudeville.

It must be noted that at the present writing there are more and more articles appearing in the periodical literature that demand better training in accuracy, thoroughness, perseverance, obedience, industry, etc., etc. Many of these pleas come from leading men in the field of education who make no apology for referring to "old-fashioned virtues." Some of them blame the trend of the times for the disappearance, or supposed disappearance, of these characteristics of the individual, but others blame the doctrine of interest. They feel that coddling a pupil, or "jollying him into doing his work," as one of them puts it, is detrimental. These articles serve to emphasize the caution expressed above that application of the doctrine of interest must be made with extreme care. Properly applied, its friends believe that it will beget the very virtues that its enemies feel it destroys. There can be no question that there is need for attention to some of the "old-fashioned virtues" at the present.

Sources of interest. *Instincts.* The teacher does not have to create or demand interest; it already exists in the nature of the individual. The chief source of the spontaneous attention that is so beneficial for learning is in the instinctive interests possessed by all normal human beings. There is much argument to-day regarding the proper use of the word *instinct.* Many reactions designated by the older writers as instinctive are regarded by later writers as acquired. Hot argument rages in the fields of psychology and sociology. These arguments, genuinely valuable in the determination of basic beliefs, are, in the narrower problem of motivation, sources of some confusion to the teacher. It is more or less immaterial to the ordinary teacher whether reactions are instinctive or acquired provided that they are universally present in the learners who come to the class-

room. Regardless of hair-splitting it is true that normal human beings will tend to do certain things in response to certain stimuli. When we get the learners in school, they will react in certain ways almost without fail. It is immaterial, in the main, whether they inherit or acquire the reaction. For the sake of ease in presentation the older terminology involving the use of the word *instinct* will be utilized. Students disliking this term may properly classify motives under several heads, such as tendency, instinct, habitual reaction, etc. The practical implication for the teacher will be the same. Parker [8] in his discussion of this topic, which should be read by all teachers and supervisors, proposes the following classification of instinctive interests, based upon Thorndike's analysis of human instincts; he has departed from Thorndike's more technical terminology in order to be more clearly understood by the beginning teacher and the teacher unacquainted with more advanced discussions in psychology:

1. Interest in adventure and romance
2. Interest in actions of people and animals
3. Desire for social approval
4. Interest in rhythm, rhyme, jingle, and song
5. Curiosity, wonder, puzzle interest, problem interest, mental activity
6. Interest in expression and communication
7. Manipulation and general physical activity
8. Interest in collecting
9. Imitative play
10. Interest in games.

He advises against the use of the instinctive fear of physical pain, of fear of sarcasm or ridicule. Emulation must be used very carefully, as it is susceptible to wrong focus by the learner, though in some cases it may be used to advantage.

[8] Parker, *ibid.*, p. 214.

Examples. The interest in adventure and excitement is shown in the request of a lower-grade pupil at the library for a book "full of blunder and thunder." The teacher can find an unlimited number of books and stories that will provide an outlet for this natural interest and that will, in addition, give much practice in silent reading, even though they are not quite so full of "blood and thunder" as they might sound. That this interest is present with the adult is indicated by the fact that a certain periodical devoted largely to stories of romance and adventure has achieved a circulation of about two million weekly.

The interest in rhythm and jingle as well as the interest in games can be combined and utilized in dozens of drill devices, in learning phonics, words, tables, combinations, etc.

The problematic aim, so important in good teaching, is based in some measure on the pupil's puzzle interest and desire for mental activity. It should be noted in passing that the psychological reasons back of the problematic aim are equaled if not outweighed by the sociological.

The interest in construction finds a ready outlet in making farms, towns, mountain ranges, castles, etc., on the sand table; in the construction of miniature villages, weaving, making doll dresses, or cutting out illustrations for stories. The construction of scenery and costumes for dramatizations in the upper grades utilizes interest in play and social approval as well as in construction. A third-grade boy, who was a constant source of turmoil in the room, became so interested in dramatics that he asked permission to go to the basement to practice roaring for his part as a lion in "Daniel in the Lion's Den." The request was made in all seriousness and carried out conscientiously. Many teachers might have blundered seriously in ridiculing such a request or in regarding it suspiciously. In the same school the behavior of a number of

intermediate-grade boys was greatly improved because of the fact that no one who manifested a cowardly or bullying attitude upon the playground was permitted to play the part of Robin Hood in a series of little plays being given.

The instance is cited of the high-school principal who was in despair over the behavior of the ninth-grade boys. Control seemed about to be lost because there seemed to be no appeal that would have any effect. One morning, however, several of the boys appeared at the office and asked if a mirror could be placed in the boys' basement; they wished to comb their hair and "slick up." The mirror was placed as quickly as possible with inward rejoicings on the part of the harassed principal. His skillful use of appeals based upon social approval thereafter proved more and more effective in winning these boys back to loyalty and good behavior. It may be embarrassing in certain situations to have the young gallants paying attention and devotion to the young ladies of the class, but the wise teacher will recognize that here are manifestations of an instinctive interest that can be turned to pedagogical ends.

The selection of instincts to be used. In utilizing these instinctive interests the teacher should be careful in the selection of the proper ones to use in any situation. They vary somewhat with age and between individuals. Nothing is more unfortunate than the attempt of an upper-grade teacher to utilize interests that have been outgrown, unless it is the impatience of a lower-grade teacher trying to appeal to an interest not yet developed. The teacher must make sure that the interest being appealed to is active with a majority of the class. She should also be sure that there are no bad effects to be aroused together with the desirable ones. Some uses of emulation, for instance, though beneficial for learning, are likely to engender selfishness and bad feeling and to cause much embarrassment.

The teacher's personality. A second source of pupil interest in a learning situation is the teacher's personality and attitude. Emotional states are remarkably contagious. The teacher who is dull, listless, and apathetic herself begets much the same reaction from her pupils. An alert, vigorous, and enthusiastic personality is likely to have an interested and attentive group of pupils, other things being equal. Furthermore, the teacher who can and will give reasonable attention and sympathetic assistance to individual cases will get large returns in addition. The so-called "personal touch" in teaching is an exceptionally valuable attribute.

The worth of the subject matter as a source of motive. Many educators condemn absolutely such use of instinctive interests to secure motive as outlined above. Others place it secondary to stressing the intrinsic worth of the subject matter. Many teachers who happen to be popular with their pupils cite the fact that the class does exceptionally well when brought to a realization of the need and worth of the subject matter itself, but such teachers often overlook the fact that a large factor in the situation is the children's desire to do well in order to please the teacher or otherwise gain social approval. This element is difficult to estimate and is probably overlooked even in experimental studies. There can be no question whatever that the realization of the need and worth of certain subject matter is a powerful and excellent source of motive, and ideally perhaps it should be the principal if not the only source. On the other hand, it is pure waste of time to decry the use of instinctive interests that function vitally in this capacity all through life.

Group attention. The tendency in the past both in text discussions of attention and in efforts at motivation has been to think of the individual pupil. It is not sufficient to see that the individual is interested as he works and

recites; the entire group must be kept alert and interested. The necessity for and difficulties involved in this can be seen if one reviews the common situation in the traditional recitation period. The common picture shows one pupil highly attentive, a few half interested, and many frankly interested in something else. Lapses by individuals affect not only themselves but the rest of the group as well. The newer methods of organizing and directing learning are desired to provide conditions inviting the sustained attention of all.[9] The socialized recitation, free discussion, reports by individuals on common problems, committee work, and many others are worth while devices here.

Discussion Questions for Summarizing and Testing on Problem 2

1. If people only do things that are interesting to them, what then is the interest that motivates people to wash dishes, do bookkeeping, bill filing, sewer cleaning?

2. Thorndike says that if you ask a number of people what they liked the best about school they would say, "running errands for the teacher," "distributing pencils," "caring for the flowers," etc. Why do you suppose this is what they remember best?

3. In general, can the high-school student's interest in some remote achievement, such as success in life or in some vocation, be relied on as the fundamental basis for interesting him in *attending* high school? In getting him to *prepare daily lessons* in algebra, history, etc.?

4. A teacher in college physics tells the class that if they cannot learn the material they are now upon they will be unable to do the third-year work when they reach it. Is this good or bad technique?

5. Thorndike asks, "Which would you rather be, the child who asks such questions as 'Where were all the rocks before they were in the dirt?' and 'What does the rain do when it isn't raining?' or the teacher who makes fun of him for doing so? Why?

6. Children at certain ages are continually asking questions

[9] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Ch. viii contains much material in this aspect of the problem.

about anything and everything. Some psychologists tell us that this is an excellent thing, an indication of intelligence, desire to learn, mental alertness, etc. Others tell us that much of it is merely a display of egotism, a pseudo-curiosity, a delight in gaining attention, being listened to.

a. How can you know which type a given child or question falls under?
b. Give a number of specific illustrations from your observation of both types.

7. What normal interests of college students do most instructors neglect? Utilize?

8. Cite some theme topics you have had in English classes, telling which were good and which poor, with reasons for your classification.

9. Students in mechanical drawing are often asked to letter dance invitations or programs for school parties. One of the requirements of drawing departments is that all plates must be turned in in a neat and cleanly condition. This condition is more often lacking than present in their regular class work but is almost never lacking in the invitations and programs. Why?

10. A boy taking piano lessons made little progress and after four years dropped the work. Several years later as a college student he took up the work of his own volition. In a short time he had made more progress than in four years before. *Disregarding* the probable carry over from his early attempts what is the explanation of his progress? What specific motives may have been involved?

11. What is meant by the *personal touch* in teaching? How can a teacher use it as an aid to interest if he has 150 students daily? Should he specialize his energy and time upon those who need the "personal touch" most? Who *does* need it most?

12. Take any given piece of subject matter, learning product, or lesson, and attempt to construct an interesting introduction. Select any school level. Recall any interesting introductions your instructors have made and describe them.

Observation Exercise for Problem 2

Observe a class upon any level from kindergarten to college and make a record of your observations in terms of the following questions:

Teacher Activity

1. Does the teacher make skillful use of pupils' instinctive interests? Cite specific questions, illustrations, etc.

2. Does she use judgment in selecting interests to use; in regard to their general value; in regard to possible effects beyond the immediate situation?

3. Does she utilize, neglect, or override those interests which show up spontaneously?

4. Does she use the intrinsic worth of the subject matter or the pupils' need for it as sources of motive?

5. Does the teacher display those traits of enthusiasm and genuine interest herself which are likely to beget the same in the pupils?

6. Does the teacher conduct herself in an alert, cheerful, and vital manner?

7. Does the teacher avoid mechanical devices and forced attention? Does she avoid using sarcasm, ridicule, and harmful individual emulation, etc.?

8. Do her efforts seem to be such as will train children to attack new and serious tasks efficiently?

Pupil Activity

1. Do the pupils ask questions freely about things in and out of school that interest them? Do they seem confident that the teacher will receive these inquiries and assist in any problem of interest to the pupils?

2. Do they avoid flighty, erratic, and spasmodic attention to a variety of activities, related or unrelated?

3. Do they work enthusiastically and consistently upon the work before them? Do they ask questions? Discuss with each other, with the teacher?

4. Do they voluntarily make use of books, pictures, maps, other people, etc., in order to obtain more information? Have they a normal interest in "what will happen next"?

5. Do they maintain interest in the activity and its results rather than in grades, marks, "getting out early," etc.?

6. Do they manifest a growing recognition of group interests? Try earnestly to compromise individual interests with those of the group? Do they raise problems and make contributions

of interest to the majority? Drop topics in which but a few are interested?

7. Do they follow out such individual interests as are strong in such way as to benefit themselves and the group? Avoid emphasis on selfish personal interests?

8. Do any pupils seem to be repressing interests, questions, contributions through fear of sarcasm, ridicule, etc.?

9. Do their activities in sum total seem to be of such nature as to develop interest in the things they should be interested in?

Parallel Readings for Problem 2

1. Dewey, John, *Interest and Effort in Education* (Houghton Mifflin Co., 1913). An influential discussion.
2. Gates, A. I., *Psychology for Students of Education* (Macmillan Co., 1923), Chs. vii, viii, and ix. Good discussion of instincts.
3. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. iv. Good discussion.
4. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press), Chs. vii, viii, and ix. Stimulating.
5. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. xiv. Excellent.
6. ———, *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919), Ch. ix. Excellent.
7. Stark, W. E., *Every Teacher's Problems* (American Book Co., 1922), Chs. v-viii. Interesting problem-solving presentation.
8. Thorndike, E. L., *Principles of Teaching* (A. G. Seiler, 1906), Chs. iii and v. Influential early discussion, with problems.
9. Waples, Douglas, *Procedures in High School Teaching* (Macmillan Co., 1924), Ch. v. Interesting problematic treatment.

PROBLEM 3

HOW WILL THE LEARNER'S PAST ACTIVITIES AND EXPERIENCE AFFECT HIS PRESENT LEARNING?

Exploratory and Pre-Test Questions

1. Try to describe a sunset in terms you would use in talking to a man who had been blind from birth. Why do you suppose this question is asked you?

2. Come to class prepared to describe an orange to an Eskimo so he might recognize it later.

3. A man described an accident which broke his leg as follows:

> "I was stringing for the telephone company and only had one ground mole. He sent up a big come-a-long and she was a heavy one. I was pulling on her and yelled to the mole to give the guy a wrap; instead of that he threw a sag into her and that broke my leg."

a. The foregoing is in plain English. Why can't you understand it?

b. If any student in the class can translate it he should do so.

c. What has this got to do with teaching and learning?

4. The direct answer to the foregoing questions are not so important as the process by which you arrived at the answers. Keep an account of how you thought out the answers and be prepared to present it in class.

5. Some might think the above questions trivial if not absurd. Can you make application to the solemn business of education?

If you have successfully answered the foregoing questions you have discovered an important point involved in teaching. What is it? This point needs amplification.

6. Any fourth-grade boy in the far western states could explain the expression "the man (or the thing) has gone hay wire." Can you explain it? (With classes in western states substitute for the above expression, "I shall take the 'L' downtown.")

7. How many of the following questions can you answer? Are you either ignorant or stupid if you cannot answer all of them?

a. What makes a ball bounce?
b. Where does the day begin?
c. Where do thoughts come from?
d. How far off is the sky?
e. Do fish sleep?

8. Make a list of questions concerning common everyday things that seem to be involved in ordinary everyday living but which high-school freshman might be unable to answer. (Watch class discussion carefully here.)

9. On the basis of Questions 6, 7, 8, what point can be added to the doctrine discovered earlier?

This doctrine needs still further amplification—

10. In a class the question was asked, "What might have been some of the difficulties confronting William Tell, the Father of his Country?" A little girl blurted out, "Trouble with the Indians." How do you account for this?

11. The following headline appeared recently in the Chicago Tribune, "Selling Basis for Guineas Changed." What do you think it meant? (There are three, possibly four, interpretations, any of which might be correct.)

12. Interpret the following proverb as you think the various people listed below would interpret it: "A bird in the hand is worth two in the bush."

a. The interpretation by the author of the proverb.
b. An interpretation advanced by a high-school student who misread it as, "A bird in the bush is worth two in the hand."
c. An interpretation by a modern scientific farmer.
d. How do you account for the following interpretation by George Ade?

> "The most helpful advice for young people is condensed into morals, maxims, and proverbs. 'A bird in the hand is worth two in the bush.' Great stuff! If you had a bird in the hand you wouldn't know what to do with it. Besides, with two in the bush you're liable, with any kind of luck, to have a lot more birds after a while."

13. What additional point can now be added to the original doctrine?

A little girl was asked to go and see if the clock in the hall was running. After inspecting the tall grandfather's clock she reported, "It is not running but it is wagging its tail." Such remarks by children are something more than cause for merriment. They are keys to important psychological processes. Very obviously in this case the little girl interpreted a new situation in terms of meanings she already had for the words used. In more serious situations it is important to know this principle, namely, that the new is interpreted in terms of what is already in the mind.

During the early days of the war a Belgian refugee was trying to earn her living in New York City by translating American literature into French. She had picked upon the stories of O. Henry but was unable to proceed because of the unusually large amount of American slang and idiomatic usage. An American who was thoroughly conversant with British slang offered to give her the British equivalent of the American expressions. The translator being quite familiar with all continental slang was then able to translate O. Henry into French, via the British. An exactly similar situation exists when instructors attempt to teach anything new and complex to learners.

Lack of proper experience either prohibits or muddles new learning. The story is told of an intelligent individual who could never see any sense to the proverb, "It is easier for a rich man to enter the kingdom of heaven than for a camel to pass through the needle's eye." The simile was so absurd that no very good meaning was ever derived. Later this individual read that the small and narrow gateway in walled cities of the East, used after dark when the main gates were closed and barred, was called "the needle's eye." At once he had a picture of the tall lumbering camel encumbered with baggage thumping and squirming through the narrow passageway. The proverb acquired new meaning.

Utilizing the wrong past experience very often prevents learning altogether. A youngster in the lower grades, usually perfect in number work, was unable to work the following problem: "If each schooner is given three masts, how many of them could be fitted out by a ship yard that has 267 masts on hand." The teacher was at a loss to understand his inability to solve such a simple example until he made the remark, "I can't work this because schooners don't have three masts." Were the numbers in the problem too big for the boy to manipulate? Did he fail to see that division was the process called for? Was he unable to do division? Not at all. An idea in his mind effectually prevented him carrying on the learning exercise. Careless adults, both parents and teachers, would laugh at this and say that the child should have gone ahead and made the division anyway. Perhaps he should, but the fact is that he didn't. Throughout the whole process of teaching it is necessary to pay close attention to the nature of the ideas that the learner has in his mind. The fact developed above is called the *principle of apperception* and states that: the learner's understanding of anything new depends upon his past experience in general and upon that particular phase of his past experience that is uppermost at the time. The emotional attitude of his mind as well as the ideas present will affect the interpretation of the new. This holds for all levels from kindergarten through college.

The funds of past experience possessed by individual learners will differ widely. Economic status, home conditions, street and neighborhood associations, previous schooling, travel, etc., all operate to differentiate these backgrounds. A small boy in the Chicago slums was asked to draw a picture of a tree. His drawing was of a straggly specimen coming through a round hole in the cement walk. The teacher asked him to draw another, "A real tree, the way trees grow when you see them outside." The little

boy drew the new teacher to the window, pointed outside, and said, "What are you talking about? Who ever heard of a tree that didn't grow through a hole in the sidewalk!" The verdancy of many a college freshman is due quite largely to limited past experience. Furthermore, different parts of common backgrounds may be called up at different times by the same stimulus depending on the present frame of mind.

It is vital that the teacher know the approximate limits of the pupil's vocabulary and store of information. Care should be taken to see that all words used in class are understood. Difficult words that will be met in the advance assignment should be explained and illustrated. In addition to the minor applications of this principle to single words and phrases, there is the more important application to the assignment of a large topic. The more ground to be covered, the more ideas to be met, the more complicated the thinking to be done, the more careful the teacher must be in preparing the class for the coming work.

If the teacher finds that some of the pupils do not have some pieces of information that are essential to the understanding of the lesson to come, she should endeavor to supply them as effectively as possible. Many teachers have an almost uncanny knowledge of what goes on in a youngster's mind and can direct their teaching most accurately in consequence. On the other hand, many earnest, conscientious teachers are handicapped because of inability to determine what children are concerned with, or because of failure to appreciate the significance of apperception. Some teachers who realize the value of the principle are slow to see concrete applications, as the following instance shows.

A primary teacher discussing the Eskimos was having difficulty in explaining that in the far north the water is not entirely covered with ice, but that where the water flows

or moves there will be found open lanes or "leads." How such a condition could be, with ice all around, was beyond the comprehension of the class until a youngster finally discovered what the teacher was driving at, and said, "Why, you can see that in the ditch at the corner; there is a lot of ice over the water at the sides but out in the middle it's running water." The teacher had crossed that ditch four times a day without realizing that it was not merely a ditch but a piece of teaching material as well.

The same difficulty is manifested in the teacher's disregard of children's "funny sayings." These sometimes afford the very best clews to the pupil's ideas and thought processes. Those teachers who continue to regard children's ideas and viewpoints as peculiar, and who are unable to realize that their information differs materially from that of the adult, will always have trouble with teaching.

Teachers should be on the alert to see from the children's expressions and answers that words beyond their comprehension are being used. A fifth-grade teacher was surprised at the difficulty her geography class had in answering an apparently easy question, until a little girl spoke up: "Us kids don't know what those two big words mean!" In this case the children had no chance to get the meaning and had to say so. The opposite situation is just as dangerous, in which the words are used correctly without any understanding of the meaning. Pupils will often manifest an astonishing ability to use words and phrases and to make combinations the meaning of which has never entered their heads. The teacher must guard against this especially while she is presenting new words to a class. It is difficult to develop the ability to throw out check questions with which to break up such a situation.

The principle of apperception should be borne in mind when reading textbooks designed for class use. Words, expressions, and ideas far beyond the comprehension of

students using the book are often found in accepted texts. A primary reader for beginners contained the expression "a cunning snare" in an animal story. The children were utterly at a loss to see how a trap for animals could be "cunning." Even high-school and college books often contain indirect discourse quite incomprehensible to the students.

One of the commonest errors on the part of beginning teachers is to so teach as if the pupil already had in mind that which he is to learn. This may sound paradoxical, but it is none the less true. A teacher was observed struggling to teach simple words to beginners. She had pictures and flash cards and was trying to associate the sight of *d-o-g* with the sound of the word, with a picture, with the child's knowledge of dog. In trying to get him to learn the word she said, "What comes first in dog?" To the amazement of the onlookers and the great embarrassment of the teacher, the child replied, "His nose." This whole exercise was doubtless a poor piece of teaching but in this particular question the teacher had assumed that the child knew what she was actually to teach him.

The use of old material in teaching must not be mere review; it must not be monotonous repetition. It must function in interpreting the new.

Apperception or perception. It is often contended that the word *apperception* is not necessary because the word *perception* covers the same discussion equally well. It is quite true that the processes of perceptual learning are central in apperception. If the discussions were confined sharply and strictly to the acquisition of new perceptions, there would be no need for the longer term. However, methodologists have come to think of the "apperceptive approach" to any lesson as including the preparation of the learners for what is to come. Used to designate the preparation for or approach to any new undertaking, the

term apperception is quite legitimate. It embodies the old teaching maxim "From the known to the unknown." In many cases, of course, the pupils are ready for the new, and no arousal of apperceptive mass is necessary. (See the discussion of Readiness in Problem 7 of this unit.)

Still other ultramoderns decry the use of the word *apperception* because it is old and associated with Herbartianism. They may be left with their objections. When a better term is evolved or when the phase of learning indicated is no longer necessary, we may drop the term.

Discussion Questions for Summarizing and Testing on Problem 3

1. Try to describe a plain round pocket mirror to a Central African savage. (This, of course, is a parallel problem to Number 2 of the pre-test list. Note the difference in your ability to handle it.)

2. Come to class prepared to explain to your instructor the meaning of such expressions as: "balloon soup", "knock you for a goal", "take it on the lam". Substitute other slang expressions if you wish.

   a. What did you do in preparing your explanation?
   b. There are sure to be some widely differing explanations given in class. How do you explain this?
   c. Some students will explain the expression erroneously. How do you account for that?

3. In the light of this principle explain why

   The primrose by the river's brink
   To him a primrose was, and nothing more.

4. Why were the parables such excellent teaching devices? Take a specific parable and explain at some length.

5. In some schools there are certain to be mixed classes, some children being able to understand what they read and to express themselves easily, others of foreign parentage who do not read well and have a small vocabulary. What are some of the things the teacher should do about this?

6. A junior high-school teacher usually introduces lessons in industrial geography or United States history by having the students read the advance assignment aloud from the textbook, pupils reading paragraphs in turn.

a. Tell why you think this is a good or a bad procedure.
b. What are some of the results which you should expect under the circumstances?

7. A little girl once asked her teacher, "Why do I have to carry one for every ten?" and the teacher answered, "Because numbers increase from left to right in a decimal ratio." What should she have said?

8. Sometimes an instructor should begin with experimental work and sometimes by assigning readings in the text. Under what circumstances would each be the best procedure? Take a specific instance with which you are familiar.

9. Show clearly what elements of common experience would be necessary before A could teach B what an "okapi" is. Before he could teach him to desire to use a knife and fork properly. To teach him to swim.

10. Should we begin the history of the United States in the lower grades with the discovery of America by Columbus or with the situation as we now have it?

11. In some of the zoos in New York City there are pens containing cows, and calves, sheep, ducks, and chickens. Why waste space and money on such everyday things?

12. Why are jurymen excused from service in some states if they have read a newspaper concerning the crime?

Observation Exercise for Problem 3

Observe a class upon any level from kindergarten to college and make a record of your observations in terms of the following questions.

Teacher Activity

1. Does the teacher make use of the pupils' immediate environment and past experience: use words within their comprehension.

2. Does she supply new experiences quickly and easily when necessary? Does she use stories, other books, pictures, real objects, excursions, the sand table? Does she herself thoroughly understand the new experience she is presenting?

3. Does she see quickly that she has used words and illustrations the pupils do not comprehend—"has talked over their heads"?

4. Does she carefully investigate and determine the reasons for pupils' odd statements or peculiar answers?

5. Does she use test or check questions designed to get real understanding on the part of the pupils instead of parrotlike repetition of words?

Pupil Activity

1. Do the pupils' reactions indicate that they can interpret directions given them? Understand talks and questions?

2. Do they reproduce *in their own words* stories they have read or heard? Do they recognize pictures and other book material as applicable to the story?

3. Do they work out in concrete form new ideas received in instruction? In dramatization, in oral and written composition, on the sand table, etc.?

4. Do they indicate understanding by voluntarily relating personal experiences or supplying illustrations that further the discussion? Do they check up on contributions that are not related to the lesson?

5. Do they ask questions freely and confidently when they do not understand, or when they can go no further without assistance?

6. Do they offer to answer each other's questions? To explain each other's difficulties?

7. Do they consistently think, answer, question, illustrate, etc., in terms of relation between school subject matter and life about them, or only in terms of the subject-matter abstractions?

8. Does the vocabulary of each pupil when tested measure up to standard for age and grade?

Parallel Readings for Problem 3

1. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. xii.
2. ———, *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919), Chs. vii and viii.
3. Thorndike, E. L., *Notes on Child Study* (Macmillan Co., 1903), pp. 57-62.

PROBLEM 4

DO STUDENTS LEARN ONLY WHAT THE TEACHER AIMS TO TEACH?

Exploratory and Pre-Test Questions

1. In one of Kipling's tales there is recounted the struggles of a little boy learning to read. He and his tutor wrestle with the problem long and valiantly, but progress is slow and halting. At last the day comes upon which the tutor says, "You have learned to read." The boy throws down his book saying, "Now I can read—I shall never read again."

a. List *several* learnings that probably took place here.
b. Which were consciously sought by the tutor? Which were not?

2. A little girl learning to read becomes so absorbed in a story book she fails to hear people speak to her, forgets to come to supper. Closing the book at the end, she looks up and asks, "Oh, Daddy, are there any more books in the world like that?"

a. Wherein is this illustration similar to the one above? Wherein different?

3. The majority of people who have graduated from high school or college have had courses in "literature." Very few of these same people in later life voluntarily read good literature, nor can they differentiate well between good and poor literature. How do you account for this? (Find and organize several contributing factors. Consult your own experience.)

4. Is it possible that pupils studying the stories of Nathan Hale and Benedict Arnold learn anything else in addition to the historical facts and setting? Make a list.

5. What inferences can you draw concerning the nature of learning and teaching based upon the foregoing discussion?

6. Can you account for, or explain, the inference which you have drawn?

7. Give positive and negative illustrations of your inference—taken from experience if possible.

A young teacher was assigned to a school in a remote district among the oil fields of the Southwest and, arriving, found her school to be a dirty, ramshackle building set in a weed-filled yard. Paint had long since peeled off, and inside the room was indescribably dirty. Floors, walls, and windows had evidently never been washed. There were no curtains, pictures, decoration of any sort. Her pupils were to be the dirty and somewhat difficult-looking children of poor foreigners brought in to do the rough work of the region. Truly a dreary prospect. Challenged by the situation, the teacher in the few remaining days before school, started to scrub and clean. After much soap and water, she bought and hung attractive curtains. Attractive pictures were taken from magazines, mounted and placed about. Crêpe paper and other decorations were used. Unbelievably, she found some potted plants in the village. These, with a can of paint, gave life and color to the room. She sat down to wait her first pupils. Long before the opening hour the first one shyly entered, a dirty and bedraggled little girl from the squalid cabins of the workers. Standing silently in the doorway, she gazed around for some minutes and then said, "Hm'm, pretty house what you got here, I t'ink mebbe I likes to live here better than by my house!" She entered happily to await events in this beautiful place. This youngster came to school to learn to read and write. Before the first lesson, she had started to learn other important things—standards of cleanliness, neatness, and beauty. Who can doubt but that she worked harder and learned better the formal work of the school.

In another school there was a third-grade youngster who was "all boy." He was noisy and turbulent, a constant source of disorder, though never maliciously mischievous. He was bright and quick, but untrained, did not learn and did not care, smiling happily through pleading and scoldings alike. The children were practicing dramatizations of

the Bible stories, and the teacher relegated this boy to a minor part because he could not be depended upon to perform correctly. He became "one of the lions" in the story of Daniel. One day he sidled up to the desk and astonished the teacher with a request to be allowed to go to the basement and practice roaring for his part as one of the lions! He had begun to learn something else than merely "roaring." Standards of achievement, a desire to do his part well, a willingness to work overtime had started to grow. He was learning more than the mere requirements of his minor part.

A college student constantly at work in the chemistry laboratory on problems of his own growing out of the class work, was joked by his fellows and urged to drop it for the more worth while pursuits of the campus. Their chief argument was, "What do you get out of it—you cannot get a grade or extra credit on it. *There is nothing in it for you.*" But there was; the student was acquiring an immense amount of information in his field, increasing his laboratory skills, and more important, was developing a genuine and aggressive intellectual interest. He was learning much more than his fellows who were taking the course, much more than the instructor set out to teach.

The foregoing are all positive illustrations of an important characteristic of learning, namely, that learning responses to a given situation are numerous and not single. The additional responses may be negative as well as positive, however. The boy in Kipling's story learned to read but also learned to detest reading, to avoid reading in situations where it should be sought. These results were all secured by the teacher whether he willed it or not. Most adults acquired in school their dislike for literature, art, and music. Part of this is, of course, due to the nature of the individual, but much is unquestionably due to the analytic methods used in school. Literature which should be taught

for enjoyment has been taught as if literary production were the aim, an aim obviously pointless with 90 per cent of ordinary students. The inevitable result has been to conceal the enjoyment values beneath a tangle of analysis and criticism. This method of teaching literature used in most high schools and colleges is so different from the method a normal mind would utilize in using the compositions for enjoyment that boredom, disgust, and antagonism result—are learned.

In addition to learning history we may learn to love history and to apply historical generalizations to present-day events. We may study civics and government but fail to acquire ideals and attitudes making for good citizenship. We may study "current events" and not care whether the local community is well governed or not. We may study grammar and get good grades for repeating the rules and be unable to write a letter that will convey thought.

This characteristic of learning, that responses are diverse and are made simultaneously to more than one factor in the learning situation, has never had deserved prominence in discussions of learning and teaching. It is, however, permeating the work of elementary teachers and may in time penetrate the higher levels. The student, be he kindergartner or collegian, learns more than the text or teacher set out to give him. Sometimes the additional learnings are desirable, sometimes distinctly detrimental. The key to the problem is the teacher's method and the learning situation. Every one has noted with the passing of the years a distinct change in the attitude of children toward school. No longer do we have "the laggard scholar dawdling his way to school," but eager youngsters hating to miss a day. Modern methods teach children more than the three R's; they have taught liking for school, pride in accomplishment, and have motivated the pupil to do more than the mere requirement. In addition to better grasp

of the minimum essentials, he gains first, "more of the same," that is, he gets additional information and skill similar to that desired by the school. Secondly, he acquires certain attitudes and ideals which will affect his conduct and undertakings. Kilpatrick [1] has furnished us with a convenient terminology for discussing the various simultaneous learnings, calling them *primary, associate,* and *concomitant.*

The primary learnings are those understandings, appreciations, and skills which are the conscious aim of the teacher and learner. They are the things the lesson very obviously teaches. Some of Kilpatrick's students discuss primary learning as if it were equivalent to mere factual learning. Although learning of facts, when desirable, would be a case of primary learning, the term includes a wider horizon.

The associate learnings are those thoughts and ideas which are related closely to the problem in hand. They are additional facts, abilities, and skills, which may be learned in response to stimuli arising during the direct learning. They are not absolutely necessary to the primary learning but are valuable for themselves. Perfecting the acquisition of associate learnings may be delayed since they are not always necessary to and would interrupt the primary learning. Suggestions for future lessons arise from the associate ideas that appear during any lesson.

The concomitant learnings grow out of the primary work of the lesson but are not quite so closely related to it as the associate responses. They are generalized ideals and attitudes such as neatness, accuracy, or the reverse of these. Others are personal attitudes toward one's work, one's classmates and teachers, likes and dislikes for subjects and processes. They are emotional learnings, slower to develop, and uncertain of carry-over, but none the less vital in the

[1] W. H. Kilpatrick, *Foundations of Method* (Macmillan Co., 1925), pp. 102 *ff.*

development of the learner's responses. It is probable that these attitudes, standards, and ideals are incidental for the learner but must be an important matter of conscious consideration for the teacher. They cannot be "assigned" for learning by the pupil. The learning situation must be so manipulated that these concomitants develop.

Method of teaching must consider, then, more than the best methods of achieving the direct responses. In fact, it seems as if the bare routine facts that the school has insisted upon for generations can be "taught" by almost any methods. Certainly children, if normal, however much they may differ in speed and accuracy, do seem to acquire enough of reading, writing, and arithmetic in any and all schools to enable them to get along. Of course, they take longer to get it in some cases than others, and they get little else in some cases. To get more than this teaching must take into account *all* elements in the learning situation, all stimuli that will beget learning responses. The nature of the classroom, the pictures on the wall, the kind of books, but particularly the teacher's attitude and temperament, are the important items. How must she conduct herself knowing that her procedure will beget many learnings good or bad, whether she wishes or not, in addition to the thing she wishes to teach? Dewey [2] phrases it thus:

> The teacher needs to recognize that method covers not only what he intentionally devises and employs for the purpose of mental training, but also what he does without any conscious reference to it—anything in the atmosphere and conduct of the school which reacts in any way upon the curiosity, the responsiveness, and orderly activity of children.

Specifically, the teacher will utilize and encourage all spontaneous and self-motivated learning. She will be sympathetic with difficulties, errors, and slow progress. She

[2] John Dewey, *How We Think* (D. C. Heath & Co., 1910), p. 42.

will encourage and accept questions from the class. When learners on any level are devoting all their energies to the accomplishment of ends that they themselves deem valuable, desirable concomitants are almost sure to develop.

It is obvious, of course, that much of this discussion rests upon theoretical psychological considerations, there being little objective material upon the problem.

Discussion Questions for Summarizing and Testing on Problem 4

1. Two small boys hid the rubbers and umbrella of a little girl in their grade one rainy noon making her late for lunch and causing her much distress. The teacher made them serve the little girl for a week, bringing her coat and hat for her, getting books from the reading table for her, etc.

a. Was this good procedure? Under some circumstances? Under all circumstances?
b. Would it make any difference if the punishment was highly approved by all the other children in the room?
c. What learnings of any kind may have taken place? Make lists depending on given sets of circumstances.

2. In an English class there arose a vigorous discussion about aviation. Pupils were asking questions right and left, and finally one of them asked the teacher if she could tell him how many times an airplane propeller turned per minute. The teacher shut off the discussion, saying, "This is an English, not an aviation, class."

a. What would you have done, being equally ignorant of the answer?
b. What was the probable effect on the learning process?
c. List learnings that might have taken place under other circumstances.

3. Recall the case of the geography class that wrote to the weather bureau for information. (Question 8, Pre-Test List, Problem 1.)

a. List the direct, associate, and concomitant learnings that probably resulted.

4. Present in some detail illustrations from your own school experience (on any level) showing the stimulation of desirable associate and concomitant learnings.

5. Present similar illustrations showing the inhibiting and discouraging of such learnings.

6. Why are the simultaneous learnings, particularly the concomitants, of such vital importance?

7. What is the place of direct and incidental teaching in aiming at ideals, attitudes, etc.?

8. Make a list of the chief factors that seem to stimulate desirable concomitant learnings. (Go beyond the brief list in the book, and be more specific. Search your own experience as a student.)

9. Can you explain this characteristic in terms of the *bond theory* of learning?

Parallel Readings for Problem 4

1. Kilpatrick, W. H., *Foundations of Method* (Macmillan Co., 1925), Chs. i, viii, ix. Most detailed discussion in print.
2. Dewey, John, *How We Think* (D. C. Heath & Co., 1910), Ch. iv.

PROBLEM 5

HOW WILL DIFFERENCES AMONG THE LEARNERS AFFECT LEARNING?

Exploratory and Pre-Test Questions

1. The instructor should obtain in advance enough practice sheets for one of the well-known arithmetic tests. Select easy problems in the fundamentals which can be worked with great speed. Give each student a sheet and allow ten or fifteen minutes for working. Place scores on board.

a. Note the lowest and highest score made.
b. How many times is the lowest score contained in the highest?
c. How many individuals approximated the lowest score? The highest score?
d. What is the most frequent score made, that is, the mode?
e. How many times is the mode contained in the highest score? The lowest score?
f. How many were surprised at the range of difference even in a college class? Why were you?

Differences in a college class should be less than in high school or elementary group. Let us examine one of the latter groups.

2. The class should mark with a (1) the occupation in the list below which they like the best, with a (2) the next best, and with a (3) the third best. The instructor will prepare a table on the board as students read off their choices.

a. Note the disagreement.
b. Wherein are these differences quite different from the differences illustrated in questions 1 and 3?
c. How do you account for these?
d. Are such differences of any importance in teaching?

List of occupations to choose from

i. Touring leisurely in your own car
ii. Reading detective stories, adventure, and romance
iii. Reading travelogues, the *National Geographic,* scientific discoveries, etc.

iv. Sitting on the beach, lying in a hammock
v. Seeing moving pictures
vi. Hearing the symphony
vii. Playing bridge or other card games
viii. Playing tennis, golf, or other outdoor games
ix. Eating an excellent dinner
x. Fishing
xi. Caring for a garden, growing flowers, etc.

3. Answer the questions under (1) above for each of the following. In each table use the lowest score mentioned and the highest.

SPEED OF READING IN 3B GRADE

No. of Pupils	Words per Minute
1	76–100
8	101–125
4	126–150
3	151–175
2	176–200
1	201–225

ADDITION PROBLEMS CORRECT, 6TH GRADE

Correct Answers	No. of Pupils
5– 6	1
7– 8	1
9–10	4
11–12	4
13–14	2
15–16	4
17–18	9
19–20	13
21–22	21
23–24	13
25–26	9
27–28	12
29–30	4
31–32	4
33–34	1
35–36	1
37–38	1
39–40	2
41–42	1
43–44	

SPEED OF READING IN HIGH SCHOOL

No. of Pupils	Words per Minute
2	76–100
1	101–125
20	126–150
27	151–175
49	176–200
29	201–225
15	226–250
17	251–275
7	276–300
0	301–325
2	326–350
2	351–375

If instruction is adapted to the mode or middle of the class how much time will the brightest pupils have to waste? How many times too fast for the slowest?

4. A student judged to be of good average ability by the teacher is absent three months because of illness. Upon recovery he studies with a tutor for a very short time and rejoins his class, keeping up without difficulty.

List three or four questions that this incident suggests to you, supplying tentative answers to your own questions.

5. Parents and teachers have a great store of erroneous ideas concerning the way in which children differ, particularly concerning very bright or very dull pupils. Can you recall any of these. Discuss them briefly and list them for further discussion after study of the text.

There appeared one fall at a Western college a freshman who might have stepped out of a storybook. His trousers failed by good margin to reach his shoe tops, his arms dangled from skimpy sleeves. His chubby face was surmounted by a mop of blond hair and a funny hat. He came from far back in the hills. Like storybook freshmen he astounded the campus in a preliminary examination by turning in three solutions in thirty minutes for a trick question in mathematical physics which graduate students rarely solved at all! Later he constructed a pistol out of material picked up around the college shops and also constructed a carburetor for a motorcycle that functioned satisfactorily. He was constantly springing new ideas upon his mathematics and shop instructors. At the end of the first term his instructors in history, geography, and English composition marked him hopeless and failed him, asserting unanimously that the boy was totally devoid of *imagination!*

Here we have an illustration, an exaggerated but none the less striking one, of the importance of understanding differences in learning type, performance, and interests. The boy possessed an imagination little short of the genius, but it was not the type the other instructors knew or desired.

Differences among learners in one and the same class are illustrated by Thorndike [1] through an exhibit taken from two spelling papers:

Pupil A	Pupil B
greatful	gratful
elegant	eleagent
present	present
patience	paisionce
succeed	suckseed
severe	survere
accident	axadent
sometimes	sometimes
sensible	sensible
business	biusness

Probably a very early generalization on the part of every child is that one parent is more easily handled than the other. It is soon learned that some people are good-natured, others not; some quick, some slow, etc. This fact of individual variation is one of the most obvious and is observed everywhere. The veriest beginner in teaching will note that her pupils vary materially in different ways. Although children of any age group have certain fundamental characteristics in common, thus making possible group instruction, they differ markedly in many details, so that all possible attention to them as individuals is necessary. No two children in any class will have exactly the same inherited tendencies, and, furthermore, they will have been influenced by all the myriad factors in differing home, school, and street environments.

A striking illustration of the complex differences to be found in any one class, and to which the teacher must adjust is presented by Wilson, Kyte, and Lull: [2]

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[1] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler Co., 1906), p. 83.

[2] Wilson, Kyte, and Lull, *Modern Methods of Teaching* (Silver, Burdett & Co., 1924), p. 180.

DATA CONCERNING THREE PUPILS IN THE SAME CLASS RECOMMENDED FOR PROMOTION TO THE SEVENTH GRADE

DATA ABOUT EACH PUPIL	PUPILS RECOMMENDED FOR PROMOTION		
	A	B	C
Sex	Female	Female	Female
Chronological age	12–1	11–5	9–9
Previous progress	Slow	Rapid	Very rapid
Age-grade status	Over age	At age	Under age
Mental age	11–3	13–7	15–10
Intelligence quotient	88	120	162
Intelligence classification	Dullness	Superior	Genius
Educational Achievement:			
Woody-McCall arithmetic score	22	32	25
Woody-McCall arithmetic age	11–2	14–4	12–1
Woody-McCall arithmetic quotient	87	126	124
Arithmetic accomplishment quotient	96	105	76
Morgan-Ayres spelling age	9–7	13–2	14–1
Morgan-Ayres spelling quotient	75	115	144
Spelling accomplishment quotient	82	91	89
Wilson language errors			
Total scores	49	62	72
Stanford Achievement Test:			
Paragraph meaning score	54	78	104
Sentence meaning score	28	74	76
Word meaning score	35	55	70
Total reading score	117	207	250
Computation score	80	120	128
Reasoning score	56	104	108
Arithmetic score	136	224	236
Science score	26	51.5	71
History and literature score	8	68.5	61.5
Language usage score	17	38	52
Spelling dictation	96	152	172
Composite achievement	40	74.1	84.3
Composite achievement age	11–2	14–10	16–2

The differences will be in intelligence, capacities, temperament, in social qualities, etc. Sometimes the variation will be due to heredity and will thus be permanent and susceptible to but little change. In other instances it will be a temporary thing due to any of several environmental causes. A later discussion in this volume will include discussions of tests and their relation to detecting differences and remedying those that can be affected by training. Obvious as the fact of difference is, many teachers and parents seemingly fail to realize its significance, at least they fail to adjust to it as expertly as might be desired.

Causes of individual differences. As indicated above the causes of variation are two:

1. Biological variation, perpetuated by heredity
2. Environmental factors
   Illness, absence or irregular schooling, poor teaching, poor home attitude, nutrition, sleep, etc.

A cause of difference advanced lately is the action of the endocrine glands. The effect of gland action on growth, mood, energy, etc., is widely accepted to-day. This cause is hereditary in the sense that the glands themselves are inherited structures. But it is believed that gland action is affected by environmental factors to a degree that the resultant effect upon the individual may be said to be environmentally caused.

Differences due to heredity are less susceptible to improvement than those due to environmental causes. Careful individual assistance by skilled teachers will, however, develop handicapped individuals so that their store of understandings and skills will show an improvement.

The multitudinous factors of heredity and environment that may combine to produce myriad differences among pupils are clearly shown in the following table exhibited by Wilson, Kyte and Lull: [3]

[3] *op. cit.*, p. 175.

SOME DATA WITH RESPECT TO THREE SCHOOL COMMUNITIES IN THE SAME CITY, INDICATIVE OF THE WIDE VARIATIONS TO BE FOUND

FACTORS	PERCENTAGE DISTRIBUTIONS IN EACH COMMUNITY		
	A	B	C
Nativity of Parents			
Born in the state	31	15	12
Born in other states	52	38	19
In British Empire	7	3	4
In Latin countries	3	8	21
In Germanic countries	4	11	6
In Scandinavian countries	1	10	2
In Slavic countries	—	6	32
In Oriental countries	1	7	1
Miscellaneous	1	2	1
Race			
White	97	66	92
Black	2	27	7
Yellow	1	7	1
Citizenship Status			
American-born	83	53	31
Naturalized	14	16	11
Non-naturalized	3	31	58
Occupations of Fathers			
Agriculture	2	—	1
Clerical occupations	9	15	11
Domestic and personal service	3	11	17
Extraction of minerals	1	—	—
Manufacturing and mechanical industries	12	49	44
Professional service	34	4	1
Public service	3	1	3
Transportation	4	13	15
Trade	32	7	8

Even a cursory study of this table indicates how varied must be the teaching problems within one community.

Differences in intelligence. Although all of the "intelligence" tests measure in part acquired ability they do give a reasonably accurate measure of learning capacity. Both *mental age* and the *intelligence quotient* (terms you learned in your courses in tests and measurements) are material aids to a teacher in understanding the composition of her class and the problems of individuals.

The differences between imbeciles, morons, ordinary children, and very bright children are obvious, and no one denies that they need differing treatment and do differing amounts of work. But in the ordinary schoolroom the differences are much less marked than those just mentioned, and more difficult to detect. Even when the class is divided roughly into three groups, slow, average, and fast, these groups shade off imperceptibly into each other. With a normal distribution of intelligence, the lowest 10 per cent of the class is not capable of doing anything like the amount of work covered by the highest 10 per cent, nor even as much as the middle 10 per cent. Sometimes the distribution will be such as to place the majority of the class toward the lower end of the curve, sometimes well toward the upper end.

Recent research on the nature of intelligence and its measurement seems to indicate that though limits for individual development are set, the limits for most normal people are relatively wide. It is also indicated that original differences in intelligence, though modifiable, tend to persist. That is, the bright child tends to remain bright, the dull one, dull. Furthermore, contrary to popular belief, the bright child is also likely to be physically active, socially developed, and interested in a variety of things. He will usually play more games than the duller classmate, enter into more activities, display leadership in various ways. He is not an anemic bookworm, but is, paradoxically, more normal than the normal child.

Differences in special capacities and abilities. If any group of children is given a set of simple arithmetic problems, well within their grasp, one or two pupils will do from three to six times as many problems as one or two other pupils, the rest of the class falling in between. Actual instances show one pupil doing three problems while another in the same class was doing twenty. In another case one pupil did five while his seatmate did forty-four. The median student was four times faster than the slowest one. In spelling one boy got twenty words right while a classmate got ninety-six, the median pupil getting seventy. Wide differences can be noted in written composition, in drawing, in music, though they are more difficult to express. Similar differences are noticeable in motor skills.

These special abilities rest in part upon inherited capacity, in part upon training. Recent research indicates that the ordinary capacities needed in daily life are rather evenly distributed. That is, an individual is likely to be reasonably good, or rather mediocre, or quite poor in all lines rather than strikingly good in one or some, and mediocre or poor in others. Although there are undoubtedly genuine cases of being "born short" and "born long," this doctrine needs careful qualification. We cannot excuse poor performance in one subject coupled with obviously good results in most others. Poor performance is much more likely due to lack of desire, lack of energy, personal whims than to being "born short." Pupils who perform well in some subjects can be expected to perform about as well in most others and vice versa. The few striking exceptions to this general rule should be treated sympathetically.

Differences in image type, temperament, social qualities. Pupils vary in the kind of images, visual, auditory, motor, etc., that they use in their mental processes. There are a number of easily administered tests for the determination of image type, and there was for a time

great interest in attempting to utilize the results of such tests in teaching. Teachers were advised to stimulate the pupil through the sense in terms of which his imagery was carried on. Others advised to stimulate him in different terms than those in which he commonly worked. Some of it sounded logical to the amateur psychologist, but the facts are that the individual may not remember and think in the same terms in which the original material was received. Many people who are clearly visual in imagery learn easily through auditory perception; others who are markedly auditory or motor in imagery learn best through visual presentations. In other words, imagery and perception do not necessarily proceed in the same sense modality equally well. Practically every one is more or less mixed in type, capable of imaging in any of three types.

The traditional temperaments are the sanguine, choleric, phlegmatic, and melancholic. These are found in many degrees and combinations, of which but a few can be mentioned. The too sanguine individual is usually rather quick but superficial, tending to shift attention rapidly and to be satisfied with mediocre results, which he maintains are good. He usually needs to be held somewhat rigidly for results and to be made to understand that his judgment of the results is not sufficient. The choleric temperament, as the name indicates, is quick to anger, but usually as quick to cool off, usually very positive in likes and dislikes, narrow in judgment. Choleric types may be, however, very good thinkers in some instances when not excited. They need to be trained in self-control by social means, and in the suspension of judgment. Difficulties with this type will probably arise more often in discipline than in learning. The phlegmatic type is slow and more difficult to arouse to interest and effort, though they may be fair thinkers. The melancholic tends to be self-centered, narrow in range of thought and interest, slow in getting results.

Some first-rate thinkers of delicate temperamental balance go to pieces easily under fire of rapid questioning or examination. Other children and older students who are overly emotional are prone to take things too seriously and need a little fun injected into proceedings. They will do better when handled quietly than by rebuke. Some students have "single-track" minds and go to pieces temperamentally when the teacher tries to stimulate class discussion of related topics. The teacher's manner, voice, dress, social characteristics all have a marked effect on temperamentally variable students on all levels.

Students on all levels differ widely in personal and social qualities, and the school should do its utmost to develop capacity for leadership in those who show aptitude, to develop ability to understand other people and to manage social situations. In some instances the teacher will have to redirect or repress a wrong type of leadership that will appear.

These qualities are not susceptible to exact measurement but can be detected easily by both teacher and pupil. In a certain sixth grade made up largely of the "rough-and-ready" type of boy, there was one lad of somewhat better social status and home training. He manifested an ability to talk to teachers and visitors without embarrassment, to think on his feet, and to carry off difficult situations in a way that put to shame the more boisterous members of the class. Though distinctly not a "sissy," this boy was not popular with his mates and was rarely, if ever, chosen for a prominent place in playground or other pupil activities. But when the entire grade was caught in a serious misdemeanor that necessitated appearing before the august presence of the principal, they with one voice, chose the suave young diplomat to present their case.

This recognition of the different types of leadership has its lessons for the school. Pupils can be made conscious

of the problem involved and be stimulated to develop the necessary qualities through the study of great leaders in history and fiction, in social and political affairs. The socialized recitation, committee work by pupils, the accurate portrayal of certain characters in dramatization, all afford opportunities for training some of the capacities under discussion. There are, of course, many more of these personal characteristics than those mentioned above. Parker [4] mentions self-control, energy, precision, thoroughness, originality, coöperation, self-denial, self-reliance, refinement, sympathy, etc., etc.

Age-grade and age-progress differences. The school entrance age has been traditionally six years, and progress thereafter was thought to approximate a grade a year. The analytic, objective studies of the past decade, however, have made clear that six is not necessarily the best age for all pupils to enter, and that the grade-a-year process through the school is but a pleasant fiction.

A great number of unsuspected facts came to light when this supposedly simple factor of age was investigated. The simple but very important discovery was made that the very method of computing school age was careless and inaccurate. Strayer and Engelhardt [5] in *The Classroom Teacher* present elaborate tables for determining more exactly the age group in which it is proper to classify a given pupil on a given date and for establishing more accurate age groups for the school grades.

A study of mental age in relation to chronological age makes clear that six is not universally the best age for entrance. The tables referred to above should be interpreted when possible in the light of mental age, since

[4] S. C. Parker, *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919), Ch. xi.

[5] Strayer and Engelhardt, *The Classroom Teacher* (American Book Co., 1920), Ch. viii.

progress and achievement at any chronological age are qualified by the mental maturity of the individual, or his mental age.

By examining any grade in the light of these tables, the exact number of under-age, normal-age, and over-age pupils can be determined. Obviously, the type of material presented, the mode of instruction used by the teacher, the progress of individuals and of the class will all be vitally conditioned by the relative size of the groups within any grade.

While the facts regarding the age groups in any grade are of assistance in adapting instruction to that grade, they should be supplemented by the facts regarding differences in pupil progress. Such facts, of course, can only be made available when there are complete and accurate records, for the pupils concerned. These records should show for each pupil the date of entrance, continued absences, if any, regular and irregular promotions, failures whether grade or subject, etc. A compilation can then be made for any given class showing how many pupils and which ones have made normal progress of a grade a year, how many have failed of promotion one or more times, how many have "skipped," or been promoted to a grade or half-grade higher than the one next above. The study should be carried further to discover in which grades the majority of failures take place and at what places in the system pupils seem to "skip" with greatest ease. The number of failures in individual subjects should be determined. These latter facts are valuable for guidance in revising the course of study, in examining the marking system, or in remodeling the teacher's method of presentation. The facts regarding grade failures or "skips" should direct attention to the pupils as well, so that their native intelligence, health, home conditions, opportunities, etc., may be investigated.

When all the facts concerning age distribution and in-

dividual progress have been gathered, the two factors can be combined to show even more clearly the nature of the class under discussion. This combination will place the pupils in nine groups, since slow, normal, or rapid progress is possible for any child in any of the three age groups. As a rule the over-age pupils rarely, if ever, make rapid progress, and only a small percentage make normal progress. The under-age pupils usually make normal or rapid progress. The fact that they are under-age for the grade is in itself one indication of rapid progress. The bulk of the class will usually fall in two groups, over-age slow-progress and normal-age normal-progress. Every effort should be made to bring the normal-age group at least into the normal-progress list.

The foregoing discussion can be made somewhat more concrete by examining the following figures. About one hundred seventh-grade children in Summit, New Jersey, were given the Terman Group Tests for mental ability and were found to range in score from 24 to 167, with a median of 72.36. Since the standard median is 67, and since the curve of distribution was nearly normal in shape, the class can be adjudged about normal.

Using an age-grade table, computed for the proper date, however, 50.9 per cent of the group were found to be of normal age, 9.9 per cent were under-age and 39.2 per cent were over-age. Examining the grade-progress statistics, 49.14 per cent were found to have made normal progress, 15.25 per cent, rapid progress, and 35.34 per cent, slow progress. This shows, disregarding other factors for the moment, that age and intelligence do not necessarily correspond, nor do progress and intelligence.

The foregoing figures were kindly furnished by Superintendent H. A. Sprague of Summit, as was the following abbreviated statement of the remedial measures to be applied by administrative and supervisory officers:

Pupils of high intelligence quotients as shown by test are being promoted immediately after examination, provided that their class work is of high grade. These children are inspired by such promotions and invariably succeed. . . . The children who are doing particularly strong work, but for whom we cannot secure sufficient evidence for immediate promotion, are brought together into small coaching groups and are invariably promoted at the end of two months. . . . Pupils at the low end of the scale are placed in a special school where they may receive a more varied type of training, or are brought together in small groups for special coaching in order that they may be promoted with their grades. . . . It may be seen that the low positions in the age-grade and grade-progress tables should be overcome by intensive and persistent work. It is our plan to overcome such distributions by special treatment.

When in the beginning of the term classes are necessarily oversize, the director of this special work is asked to reclassify or grade the children on the basis of their achievement and intelligence ratings. A progressive class for especially rapid promotion has been organized. The work of these pupils will continue under one teacher for a long period of time. A considerable saving is expected to result from this organization.

Education quotients will be obtained in order that pupils may be instructed according to their capacity for good work. . . . Special attention is given to the pupils in the first and fourth quartiles of all grades by way of follow-up work. . . . All new pupils are tested and recommended for placement.

Sex differences. Differences due to sex are neither so great nor so important as once thought. Boys are more active and aggressive, less neat and exact than girls. Obviously, the boys possess funds of information from reading and from street contacts that girls do not have, and vice versa. These differences in apperceptive mass are, however, becoming less and less under modern conditions of life. Common observation indicates that the sexes differ in instinctive reactions, the boys being more pugnacious and impatient of restraint, the girls more docile and sympathetic.

Though there is no real difference in mental ability be-

tween the sexes, there is far greater variability in ability among males than females. The few brightest and few dullest pupils will usually be boys. The girls are more closely grouped about the norm.

Differences in mode of learning. Morrison [6] discusses an important type of difference to be found, one which seems to be in general learning type. When groups of pupils are tested, first traditionally, on assigned material, on their daily preparation, and second genuinely tested for true learning products, through the use of new material, three distinct types are discovered.

One group, which Morrison calls the "lesson learners," makes excellent grades on prepared material, that is, they make a good daily showing on the assignment, but show no independent power on new material. They can prepare assignments in French, but they cannot read French; they can work assigned exercises in mathematics, but they cannot recognize real situations that necessitate the use of the mathematical principles involved. They are the type of pupil who says "What-do-I-do-next?". When pressed for argument or interpretation, they retreat behind the statement "That is what the book says." These students have learned their lessons, but they have not learned.

The second group is designated the *transfer type,* since there is evidently some transfer from the daily preparation activities to real situations. In preparing the assignments, in doing the exercises, in studying their lessons, these students actually do acquire the true learning product, whatever it may be in the given case. Under good conditions, and with competent teachers, there is a good chance that this transfer will take place, but under ordinary conditions it often does not take place. Sometimes, even, the teaching is not such as to get other than lesson learning, and

[6] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), pp. 58 *ff.*

the pupil actually acquires the true learning result in spite of the situation.

The third group is an odd one not easily explained, consisting of those who do poorly the assigned material, who make a poor showing on the traditional school tasks, but who, oddly enough, do acquire the desired learning product. When tested, they manifest real power. A number of psychological explanations can be advanced, but which is the right one is for conjecture. Morrison calls them *direct learners*. They achieve true learning by direct processes of their own. Many of them are so ill-adapted to traditional school learning conditions that they become problem cases.

Problem cases. Many individuals will differ so widely from the norm in any one of the items listed in the preceding pages that they become problems to the school. Many special methods and administrative devices have been evolved in an attempt to care for them. The ordinary teacher is concerned chiefly with recognizing these cases and reporting them for special administration. This involves the whole staff of the personnel department and, in the larger schools, of the child-study department, or the special personnel officer. Detailed psychological discussion of the nature and treatment of problem cases are to be found in special volumes and courses.

Distribution of differences among learners. How great a variability may a teacher expect in any given class? For any given group the teacher should give a test and construct a graph or surface of frequency showing precisely the nature and amount of difference existing. In general, measurements of any human trait tend to approximate the normal or bell-shaped curve of distribution. This holds only for large numbers of unselected individuals. In small classes, however, the majority of pupils will ordinarily be found grouped around a certain place, with a few variants at either extreme. That is, there will be large

numbers who vary little from each other in intelligence, in ability to add, in skill in writing, and few who are much poorer or much better than the average. In high school and college the variation is progressively less and less. There is some difference of opinion as to the number of variants and the difficulty of adapting instruction to them under ordinary conditions. Bagley [7] and Thorndike [8] each thinks the spread within a class will be reasonably great and adjustment a considerable task. Parker,[9] on the other hand, stresses the "bunching" of the distribution and advises individual attention to smaller numbers. Morrison [10] believes that from 5 to 10 per cent will be so poor as to need serious individual attention, and a smaller group at the other extreme who need extra assignments and voluntary projects. The situation will vary with regions and with economic status.

The teacher's adjustment to the fact of variation among learners. *Errors to avoid.* There are ordinarily three errors made by teachers in reacting to variation among learners. One is ruthlessly to override anything of the sort and to teach as one wishes to teach, or as the plan book says to teach, regardless of intelligence level, special ability, temperament, or other item of variability. This teacher usually teaches to the middle group in the class. The second error is to overstress either extreme. The dull group gets far more than its share of time in patient coaching in and after school. A few very bright and unusually gifted children are exploited at the expense of the majority. The third type of error is a common one with naïve thinkers, namely, thinking of other people in terms of one's self. This teacher understands only those

[7] Bagley and Keith, *An Introduction to Teaching* (Macmillan Co., 1925), Ch. viii.
[8] Thorndike, *op. cit.*, Ch. vi.
[9] Parker, *op. cit.*, Ch. xi.
[10] Morrison, *op. cit.*, p. 85.

pupils in the class who approximate her own speed or slowness of thought, her temperament, her breadth or narrowness of view. They fare well but the wrath of the ruling goddess is visited upon those whose minds, temperaments, and reactions differ from hers. However, the vast majority of teachers with modern training and view are keenly aware of the problem and sincere in their desires to adapt instruction within reasonable limits to meeting the situation. Many teaching and administrative devices have been worked out to aid teachers.

Using tests and measures. Giving standardized intelligence tests and educational measurements, and interpreting their results in order to determine the nature and extent of difference is a first step toward meeting the problem. A later unit in this volume will discuss in some detail the use of tests in adapting instruction.

Grouping pupils. An excellent device is to group pupils into more or less homogeneous divisions. Sometimes these groups are organized separately as "A" and "B" divisions, or into "slow," "medium," and "fast," or "X," "Y," and "Z" sections. In smaller schools the class is kept together for instruction. In either case instruction is adapted as far as possible to these three groups.

Growing out of this we have "parallel courses of study," "differentiated courses of study," providing for either different rates of progress or a greater or lesser amount of work to be done in the same time.

The elements in the grouping scheme are: division into two or three sections, a minimum assignment for all to complete, supplementary assignments for the bright pupils. The details of organizing these assignments is treated in a later unit in this volume on the technique of assignment.

A common objection to any plan involving division into groups is that it is undemocratic and stigmatizes those pupils in the slow group. Many such objections are based

upon theoretical and highly sentimental reasons, and it is the duty of the administration to conduct a careful educational campaign through any agencies that offer. There is no reason to see dire consequences for democracy in group divisions when those divisions are based upon incontrovertible, mathematically precise evidence. If parents object to their children being placed in the slow group when intelligence tests, special-ability tests, the opinion of half a dozen teachers and supervisory experts place them there, then the parents must be tactfully educated and made to see that it is more efficient and better for the child. If they cannot be so educated, they will have to be left with their objections. Sometimes such people will be numerous and powerful enough to affect public opinion and break up the system. As soon as they have broken it up, it should be started over again as quietly and carefully as possible.

However, much of the criticism can be averted by proper administration of the scheme. No one outside the school officers need know the real nature of the divisions. In places where difficulties have arisen, they have often been traced back to injudicious remarks by teachers. Scrupulous care should be taken to avoid any derogatory designation of the slow groups. There is an advantage in this respect in cases where the whole group is kept together, the brighter ones being excused from some recitations and drills.

Even when the division is actually made and the idea underlying it is known, trouble is often avoided. Tactful introduction and explanation of the plan prevents many untrue and unfair ideas and foolish remarks from being circulated.

Individual instruction. Followed to a logical extreme, adaptation to differences results in efforts to teach each pupil as an individual. Actual efforts to do this began in Pueblo, Colorado, in the early nineties. Later schemes

were organized at the San Francisco State Normal School, at Winnetka, Illinois, and at Dalton, Massachusetts. The last two schemes have become famous under the names of the towns where they originated. The essential elements are careful preparation of printed assignments and sets of directions. The pupil can work at his own speed. He tests himself according to directions at the conclusion of each unit. The teacher is thus free for individual assistance as needed. For most classroom situations as now organized some combination of class instruction supplemented by individual attention is probably best.

Supervised study. This movement now well established in the country is a device in adapting instruction to individual differences. It is presented in detail in a later unit of this volume.

Administrative devices. Adaptations to individual differences by means of administrative devices are becoming more and more common and are accepted by all but the most formal school people. One such device is the provision that allows the pupils markedly advanced or markedly slow in one subject to take that one subject with a grade other than the one they are regularly in. Many slow, retarded pupils can be given a large amount of work involving manual skill and in such subjects keep up with grades well in advance. Transferring over-age boys to the junior high school has been beneficial in many instances. There is always a sprinkling of pupils who are remarkably poor spellers, or poor in number work, but who can keep up otherwise. In many places even yet such failure prevents passing to the next grade. Such practice is obviously without rational basis, is unfair and detrimental to the student.

Another device is to pass pupils from one grade to another, not for one subject, but permanently at other than the regular promotion periods. Many of the very bright

pupils are entirely competent to carry the work of a grade beyond their age level. On the other hand, many authorities object to this, holding that pupils are happier when with others of their own age. These people would care for the pupils by enriching the curriculum with much extra material (parallel and differentiated curricula). Where such enrichment is possible, this is undoubtedly a good thing, but there are many small systems where it is out of the question. Some retarded pupils are often helped in the same manner by being passed regardless of the fact that they have failed in everything. It is fairly safe to say that the retarded child should not be held in the same room for the third year. The organization of "skip sections," ungraded rooms, problem rooms, is the natural outcome of finding a large percentage of cases varying from the average.

This discussion does not mean that the regular and orderly procedure of the school should be broken up to promote individuals by subjects, or irregularly by grades. The cases calling for such treatment are not numerous enough to disrupt the system but numerous enough to be cared for when they do appear.

Discussion Questions for Summarizing and Testing on Problem 5

1. Is it true that "the more we study the more we know"?

2. To what degree should teachers permit pupils to concentrate on a special capacity? Analyze the several angles necessary in answering this question and present a supported argument.

3. Is the emphasis of most teachers upon students as groups of learners or as individual learners? Why? From your own observation illustrate particularly good and particularly bad practice.

4. A high-school history class is made up about as follows: Two boys and eight girls are of the docile type who will "get" any assignment given. They do not *understand* what they study and have neither interest in it, nor ability to apply it. Three boys and two girls are intensely interested in history, reading inde-

pendently both high-class historical novels and some original sources. They find the text and the class a bit slow and have probably more knowledge of historical thinking than the teacher. Six boys and five girls vary from good to poor. The boys aren't interested but understand it without great difficulty. The girls have no interest; it is "all Greek" to them. This latter group, not being docile, make little effort.

You cannot, of course, solve this problem at this stage of the course, but what would you as a teacher suggest doing as far as you can see now?

5. Should all pupils do about the same kind and amount of work in:

a. Reading, writing, arithmetic
b. History and geography
c. Algebra and chemistry
d. Drawing, music

6. Why is the matter of adapting instruction to variation so seriously neglected on the high-school and college level?

7. A student who is quite poor in drawing nevertheless persists year after year despite very slight improvement. What traits probably explain persistence under such conditions?

8. In a college chemistry class one of the instructors did the lecturing and another the quizzing. Each was an expert in his line. Changes in administration necessitated that each do his own lecturing and quizzing. Each proved to be very poor at the other's work. State as specifically as possible what traits, abilities, and skills probably accounted for the difference.

9. How do you think you would proceed (give simple suggestions) to adapt instruction to:

a. A girl of emotional type, superior ability in working with ideas, impulsive and suggestible
b. A boy who is "a man of action," a realist, preferring to deal with things and to deal quickly
c. A boy who is a good thinker, but oversanguine as to his abilities and results, and who has poor mental balance.

10. If there are not any serious differences in general ability due to sex, how do you account for the fact that boys are better at chess and whist than girls?

11. How do you account for the fact, alleged to be true, that girls will not coöperate as well as boys?

12. Disregarding purely personal attraction, do you expect to find your most interesting students among the boys or the girls? Why?

13. Which will be more likely to regard criticism as a personal matter, boys or girls? Why?

14. A mother complains that the school and teacher are not giving her little boy a square deal. He is not being put through school as fast as his older brother was, or as fast as his playmate who lives next door. Organize a five-minute talk to make to this parent.

Observation Exercise for Problem 5

Observe a class on any level, making a record in terms of the following guide questions. Analyze the record in an effort to determine whether the instruction was good or poor in terms of adaptation to individual differences.

Teacher Activity

1. Does the specific activity of the teacher in questioning, illustrating, helping, disciplining, indicate that she knows what individual differences are? (Cite actual classroom occurrences.)

2. Does she indicate in disposing of specific cases that she understands the differences between pupils permanently backward through inherited defect, and those temporarily backward because of absence, sickness, poor teaching, etc.? (Cite specific incidents.)

3. Does she make use of, or call for the use of, standard educational measurements and mental tests in order to determine the nature and amount of differences? Special difficulties or abilities? (What evidence could you derive from observation as this point would probably not come up every day.)

4. Does she quite plainly use a minimum-essentials requirement for all, supplementary work or other provision for the accelerated pupils, some system of individual attention to the slower ones?

Pupil Activity

1. Do the quick, bright pupils contribute actively and intelligently? Do they receive the contributions of the slower ones without manifesting impatience?

2. Do they find extra work to do? Keep busy at additional assignments? At new sources? Practice skills and associations in which they are weak?

3. Do the slow pupils seem confident that they may ask questions, or make contributions?

4. Do they try to determine their own difficulties in recitation, or in formal skills, and attack them in practice?

5. Do any of them seem timid, or afraid to contribute?

6. Do pupils refrain from criticism and discontent when they are treated differently? (That is, is there a recognition of the justice of different treatment for different individuals in the same situation?)

7. Do the pupils themselves recognize special ability possessed by some individuals in the class? Are the artists, authors, diplomats, leaders, etc., used when the opportunity presents itself?

Parallel Readings for Problem 5

1. Bagley, W. C., and Keith, J. A. H., *An Introduction to Teaching* (Macmillan Co., 1924), Ch. viii.
2. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. xv.
3. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. xv.
4. ———, *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919), Ch. xi.
5. Thorndike, E. L., *Educational Psychology, Briefer Course* (Teachers College Bureau of Publications, 1914), Part III, particularly pp. 331-339, 354, 368, 376-401.
6. Wilson, H. B., Kyte, G. C., and Lull, H. G., *Modern Methods of Teaching* (Silver, Burdett & Co., 1924), Ch. xii.

PROBLEM 6

WHAT IS THE EFFECT OF AGE UPON ABILITY TO LEARN?

Exploratory and Pre-Test Questions

1. Consider the old maxim, "You cannot teach an old dog new tricks."

a. Just what is the implication?
b. What do you think about it? Cite specific cases on both sides of the question. Are your illustrations typical or exceptional?

2. Do you know of any cases where children failed to learn, but in later years succeeded reasonably well in learning that upon which they had failed earlier?

3. Arrange a table with from eight to twenty objects upon it, selected and placed at random. Ask a small child, an older child, an adolescent, an adult, preferably several in each of these classes, to look closely at the things for ten seconds. Cover the table or send the observers to another room and ask them to write down as rapidly as possible all the objects they can remember seeing on the table. Permit no conversation. Allow a reasonable time. Compare results by ages and interpret.

4. Ask a small child to say all the words he can think of, one after the other for two minutes. Give no help and wait until the two minutes are up. Try this with older children and with adults. Keep count of the words. Compare results and interpret.

Ask several individuals to give you all the words they can think of related to a word that you supply to start them off. Use any word that comes to mind. Let them continue as long as they can give words. Compare results by ages and interpret.

One of the most commonly held views concerning learning is embodied in the old maxim, "You cannot teach an old dog new tricks." A more scientific attitude holds that it depends largely upon the age of the dog—what is meant by an "old" dog. It is well known that an *adult* rarely

learns a foreign language without accent, but will that justify the common belief that *children* learn a language better than *adolescents?* Certainly average people of *fifty* lack the suppleness and agility to acquire expertness in tennis or swimming, but does that mean that *childhood* is necessarily the best time to learn to swim? A good deal of confused thinking and uncritical acceptance of untested opinion has marked discussions of this question. Let us examine systematically the authoritative opinion and experimental data upon it. It must be emphasized that we are chiefly concerned with the effect of age on the learning period covered by the school, kindergarten through high school, and not with comparisons between children and adults.

Age and the general factors affecting learning. *Self-activity.* Is activity fundamental to learning at all ages? Does the immaturity of childhood, or the growing maturity of youth, affect this characteristic of learning so that it functions better on one level than another?

The *nature* of the activities engaged in will differ materially, but learners at all ages learn through activity. If there is any advantage, it is, contrary to popular opinion, in favor of the mature learner. He is able to control and sustain activity for longer periods than the younger learner. The differing types of activity and the greater control that is acquired with age may be illustrated by a brief statement on the nature of play activities. The child's play is largely movement, "hustling things about." This gives him action, sense of accomplishment, and power over objects. Later his play becomes deliberately destructive or constructive, motivated probably by curiosity. The child makes and breaks rules as he goes along, the youth adheres religiously to elaborate codes. The child's play is often social but not coöperative, the latter characteristic developing during adolescence and later. Individual competition,

of course, persists throughout, the youth being interested in records, acquiring skill, etc. The child dresses up and imitates. This "make-believe" activity later wanes, but the same urge is doubtless satisfied through reading romantic fiction or in contemplative enjoyment of the drama. Activity is characteristic of all ages; it can be utilized equally well at all levels. The teacher's task is to stimulate that activity which will function best at a given level.

Attention, interest, and motive. Here we find another count against the popular belief that childhood is the advantageous learning period. Ability to direct one's attention, to hold it voluntarily at high pitch, increases greatly with age. The fact that adolescents often do not give as good attention to lessons as children is not proof that they cannot. The adolescent has developed a wider range of other interests, many of which occupy him when he is apparently inattentive to learning. Proper motivation is necessary, and sources of motive differ with age. For instance, it is not true that adolescents will not and should not learn by drill processes. They need more rational motivation than that which will keep a child happily at repetition. In out-of-school activities of his own choosing the adolescent will go through drill processes to which no child could be held even by most artistic teaching. The blasé sophomore remains indifferent to motives that stir his younger brother, but he himself can be animated to enormous activity if the right motives are found. As with activity, the effect of age on motivation is to complicate teaching rather than learning.

Apperception. The effect of age upon the apperceptive basis is obviously in favor of the more mature learner. Other things being equal, each year sees the learner possessing an increased store of experience, information, and facts with which to attack and assimilate new material.

How then can James say that some people are "old

fogies" at twenty-five, that they cannot acquire new ideas (learn), or adjust to new conditions? Why is it so hard to argue with people over thirty-five? In the first place, this difficulty is probably as much due to individual nature as it is merely to age. It is an individual difference, not an age difference. Furthermore, the conditions of adult life beyond the school level are often such as to crush and eliminate the learning process. We are, as noted, chiefly concerned with learning ability during school years and under reasonably good conditions. The brilliant exceptions to the rule that age dulls thinking and learning ability are enough to justify the thought that, if learning conditions in youth had been stimulating enough, many more "oldsters" might be noted for open-mindedness and tolerance of new ideas.

Multiple response. It needs no argument to show that the more mature learner would be likely to respond in far more ways than the less mature.

Age and the types of learning. Some years ago there was considerable support for the view that childhood was the period for memoriter learning and for habit formation, while adolescence saw the beginning of reflective thought and problem-solving learning. Although the leadership in education has long since abandoned this view, the effects are still widespread among teachers and parents.

Sensori-motor learning. Nearly every one, including many teachers of motor skills, believes that childhood is par excellence the period in which to learn to swim, to speak a foreign language, to play games, to play a musical instrument.

Freeman [1] points out that there are really two questions involved. First, can a learner reach a higher degree of skill if he begins as a child than if he begins at a later

[1] F. N. Freeman, *How Children Learn* (Houghton Mifflin Co., 1917), pp. 148-155.

age? Second, do children or adults learn more quickly? It is probably true that learning begun in childhood eventually reaches a higher degree of excellence than that begun at a later age. There are, however, enough striking exceptions to this rule to render the question still open to discussion. Furthermore, age is probably not the deciding factor, but the larger amount of practice. In regard to

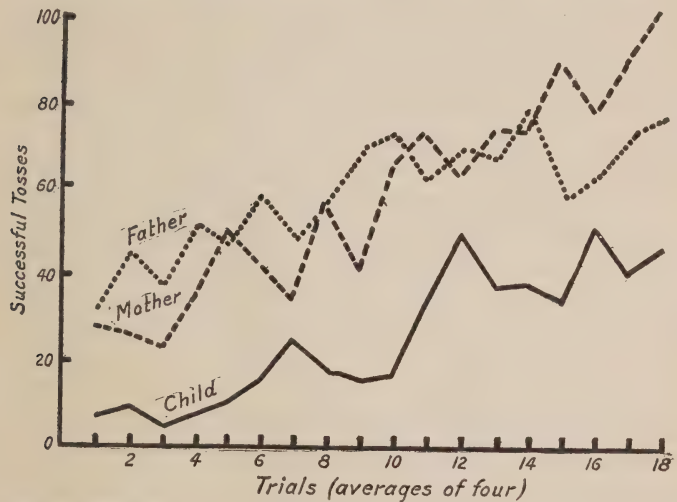

FIG. 4. CURVES OF TWO ADULTS AND AN EIGHT-YEAR-OLD GIRL IN THE SAME KIND OF SENSORI-MOTOR LEARNING

the second question it is extremely doubtful if children can learn anything like as much or as fast as adults.

Parker [2] long ago pointed out that the question was a good field for experimental attack, but few objective data have been produced. Freeman [3] presents a learning curve from an unpublished study by Gonnelly which shows quite conclusively the superiority of the adult. Two adults and

[2] S. C. Parker, *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. vi.

[3] Freeman, *op. cit.*, p. 150.

an eight-year-old child went through a training experiment in tossing shot into a tumbler. All were interested and pursued the problem with vigor. This is, of course, but one minor experiment, but it was carefully controlled and the results are significant.

In the absence of objective data, Parker [4] summarized a number of theoretical arguments supporting the hypothesis that the later years of the school period, fourteen to eighteen, are as favorable for learning as the earlier, six to fourteen. In the first place, he asserts, brain processes are, so far as we know as favorable at one age as another. Bonds may be formed, and synaptic connections made as easily at one period as another. Secondly, the older students should have more efficient methods of learning. They would be able to apply rules, to practice economically, etc. Although it is true that childhood has an advantage in suppleness and plasticity, youth compensates in part by better methods of attack, in control, and in profiting by past experience. The third argument is related to the second, holding that skills previously acquired should help the older learner in acquiring a related activity. In my own teaching of high-school typewriting classes, those students who could play the piano were so far ahead of the others that the latter protested against being graded comparatively with the first group. Finally, the ordinary observer overlooks significant factors and cases in subscribing to the belief that childhood is the most effective learning period for motor skills. There is the natural tendency to judge by extreme nonrepresentative cases. The small boy who likes to swim is compared to the adult who does not like to, has no urge to learn, but who is ordered to swim by a physician. The enormous amount of practice that childhood permits is commonly left entirely out of account. There seems to be little evidence that motor skill can be

[4] Parker, *ibid.*

acquired more easily at one age than another, provided always that motives are equally powerful, and that practice conditions are comparable.

Perceptual learning. Some factors involved in perceptual learning do not seem to develop much with age, whereas others do. In regard to sensory discrimination there is some argument. Pitch discrimination and discrimination between weights seem to develop considerably with maturity, but it may be that the seeming increase in ability is due to increased ability to attend and to adapt to the conditions of the experiment.

Perception of form and of beauty increases distinctly with age. This can be seen readily in drawing. Starting with symbolic representation in early childhood, it is some time before individual characteristics are added. Later solidity and perspective are noted and effort made to represent them.

That phase of perceptual learning involving observation and report shows much development with maturity. The older learner is able to direct and control attention, thus learning more rapidly and easily than the younger.

Association and memorizing. Again we meet a firmly fixed idea that children memorize much more rapidly and better than the more mature learner. What has careful argument to say to popular belief?

In the case of control of one's associations the mature learner is immensely better off than the child. This is significant when it is realized that association is a vital element in reasoning. Development of ability to control one's associations affects one's ability to think and to learn by reflective thought. If a child is asked to give all the words he can think of, he soon runs down, though getting a fresh start occasionally by looking about him. The adult not only cites many more words but presents organized groups of ideas representing trains of thought. The better

performance of the mature learner is no doubt due in part to wider experience, but in part also to better ability to control associations that come with maturity.

Ability to memorize increases steadily with age. The adult memorizes more rapidly and retains better than the child, particularly for organized material. For unorganized or nonsense material there is little difference. The reasons for the belief that children memorize better are similar to those responsible for the similar error concerning the preëminence of childhood in the acquisition of motor skills. Parents and teachers overlook the fact that children do not avoid memorizing as do adults; that children can be much more easily motivated to do what would be weary routine for the adult. Furthermore, the child has not learned other methods of accomplishing his results. The adult can substitute other modes for rote memorization, preferring to organize related series of ideas which serve equally well in most instances. Again, the child gets much more practice. He makes many more repetitions than the adult.

The remarkable clarity of childhood memories is often urged as an argument in favor of superior powers in childhood. This fact illustrates another law of memorization, namely, that the older an impression is, and the oftener it has been revived, the easier and clearer it is.

Problem-solving. The belief that children do not reason and cannot learn through thinking is disappearing much more rapidly than kindred errors regarding age and learning. This is doubtless because there is more objective evidence available than in the other cases, and because common-sense observation coincides with scientific inference. Research by Bonser, Stone,[5] and others as far back as 1910

[5] F. G. Bonser, "The Reasoning Abilities of Children of the Fourth, Fifth, and Sixth Grades" (Teachers College, Columbia University, 1910). John Dewey, "Reasoning in Early Childhood,"

indicated clearly that children do the same type of problem solving as adults. It is reasonably easy to prove that children can and do reason. The ability improves steadily through the school period.

The belief that children could not reason came to us from the earlier schoolmasters who used abstract theological problems with children upon which they could not reason. Secondly, children make many and often "funny" mistakes in their thinking. But the best reasoners make mistakes due to lack of information, impulsiveness, or temporary failure to exercise critical judgment. There is a distinct development in critical judgment with the years. Finally, the child is less capable of sustained careful thinking.

On the other hand, adolescence brings no new intellectual processes. Youth is acquiring information rapidly at this stage, becoming conscious of new relationships, pondering in perplexity on the difficulties that larger responsibility and wider contacts bring. The adolescent thus seems to begin thinking in the true sense. However, he uses the same processes that are present from childhood to maturity.

Emotional learning. This type of learning that depends upon emotional response is present at all ages. The nature of the stimulus and of the reaction will differ mightily at different age levels. The child reacts more quickly to crude and elemental stimuli and has less regard for the subtle and the esthetic. With maturity comes greater appreciation of the so-called higher emotional reactions.

Conclusions. Focusing attention on the general run of learners, and avoiding the influence of a few striking contradictory cases, it seems that age has little to do with ability to learn. Any type of learning can be carried on equally well at any age level within the school learning

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Teachers College Record, Vol. II, January, 1914, pp. 9-15. Cliff W. Stone, *Arithmetical Abilities and Some Factors Determining Them,* Columbia University Contributions to Education, No. 19, 1908.

period. A much more important item is the teacher's ability to stimulate and guide learning at the different levels. Although learning can be carried on at any level, it is undoubtedly harder to arouse and stimulate some desired types at certain levels. Age complicates teaching but not learning. Finally, it should be emphasized that differences in ability among learners of the *same age* are much more important than differences to be found between different age levels. Individual differences at a given age will constitute one of the teacher's most difficult problems.

Discussion Questions for Summarizing and Testing on Problem 6

1. Illustrate if you can with a concrete example Parker's point that older learners probably profit through previously acquired habits and skills.

2. Similarly, illustrate the use of better methods of study utilized by more mature learners.

3. Illustrate errors made by children in reasoning, showing at the same time that reasoning was actually taking place.

4. Even if a foreign language could be acquired better in childhood, can you see another argument which would point to delaying such study until junior and even senior high-school level?

5. Cite any specific cases you have observed of learning taking place relatively late in life, skills acquired, etc. Be careful to avoid the error of regarding these as typical instead of exceptional cases. What is the bearing of such cases on the problem?

6. A quotation from Havelock Ellis is, "It is in youth that the questions of mature age can alone be settled, if they ever are to be settled, and unless we begin to think about adult problems when we are young, all our thinking is likely to be in vain."

   a. Bearing of this upon our problem?
   b. How far would he agree or disagree with the various statements in our discussion? (Analyze his statement with care before answering.)

7. Parker asks a question about his discussion of this topic which we may repeat here. "Does the discussion leave you confused, convinced, puzzled, argumentative, indifferent, interested, desirous of reading further?" Explain at some length.

Parallel Readings for Problem 6

1. FREEMAN, F. N., *How Children Learn* (Houghton Mifflin Co., 1917), pp. 66, 90, 95, 148, 175, 203-205, 229, 240, 244. Exceptionally valuable. Good bibliographies at close of chapters including these page references.
2. PARKER, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. xiii. Excellent summary and bibliography.

PROBLEM 7

ARE THERE OTHER WAYS OF PRESENTING THE FACTS COVERED IN PROBLEMS 1 TO 6?

Exploratory and Pre-Test Questions

None. Proceed to study of text.

Much of the material presented in the foregoing pages of this unit is discussed by Thorndike and his students in somewhat different terminology. Thorndike,[1] in his psychological writings, advances three laws of learning, namely, Readiness, Exercise, and Effect. His students have elaborated the pedagogical implications of these laws in later writings on teaching.

The Law of Readiness, which, Kilpatrick [2] says, "is easier to see than to tell," states: *When a bond is ready to act, to act gives satisfaction, and not to act gives annoyance. When a bond is not ready to act, to be forced to act gives annoyance.* As nearly as can be determined from the statements of writers using this term, *readiness* seems to indicate the state of being ready to go to work, to go after the object of desire, to pursue a course of action. In the terms used in this volume, *readiness* seems translatable into a combination of, or rather the result of, motivation and apperception. A pupil is *ready* when he has a motive and the proper background is at hand with which to attack and understand the new. This interpretation seems borne out by Kilpatrick's statement, "a most important source of readiness is *set,* one's mental attitude at the time." Again

[1] E. L. Thorndike, *Educational Psychology, Briefer Course* (Teachers College, Bureau of Publications, 1914), Part II.

[2] W. H. Kilpatrick, *Foundations of Method* (Macmillan Co., 1925), Ch. ii.

he says, "The doctrine of interest says that interest . . . best utilizes the laws of learning, particularly of set, readiness, and effect. So stated the doctrine of interest is nothing more than the doctrine of mind-set and learning as we have previously discussed it."

The term *set* or *mind-set* appears much in the literature of method. It is, as indicated above, the mental attitude at the time. It is the state of being interested and desirous of following out one's purposes. Kilpatrick says, "To take interest in doing anything is to have a mind-set toward it." And again, "Interest to me is simply another way of naming and describing the psychology of mind-set and readiness." In his chapter on apperception, Thorndike [3] says, " . . . what any pupil thinks or feels or does on any occasion depends upon what he has thought and felt and done in the past and upon the present 'set' or tendency of his mind."

The Law of Effect states: *A modifiable bond is strengthened or weakened according as satisfaction or annoyance attends its exercise.* A learner tends to repeat and acquire responses that give him satisfaction; to avoid and fail to learn that which results in dissatisfaction or annoyance. The point contained in this law is not covered in other discussions; it is a point not made by writers other than Thorndike's students. Kilpatrick [4] says:

> It [the Law of Satisfaction and Annoyance] has more new things to tell us than all the others. It is strategic. . . . I mean that our schools as a rule do not pay as much attention to this law as they might. They fail to arouse readiness. They fail to see that the child gets satisfaction from desirable things. They often seem to think that exercise alone suffices. They forget that exercise with annoyance may tear down. If our teachers thought more about these things, they would succeed better.

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[3] Thorndike, *Principles of Teaching* (A. G. Seiler Co., 1906), Ch. iv.

[4] Kilpatrick, *op. cit.*, pp. 41 *ff.*

Another paragraph from Kilpatrick sets forth this view of learning admirably:

> Mind-set-to-an-end is purpose. If the child has a strong purpose, this as mind-set pushes him on to attain his end. This mind-set makes ready his inner resources for attaining this end. When he succeeds, these ready neurones and the success both mean satisfaction; and satisfaction means strengthening the bonds used. He learns by doing. His purpose helps him learn. Mind-set, readiness, success, satisfaction, learning—they follow just this way.

The Law of Exercise states: *Within limits the more often a response is made to a situation, the closer becomes the bond connecting the two;* that is, the more surely and smoothly is the response made when the situation presents itself again. This obviously implies the process commonly designated by teachers as *drill.* This will be discussed at length later in this volume.

This brief reference to the terms *Law of Readiness, Law of Effect,* and *Law of Exercise* is inserted here since they are used in the literature of method. The most important thing to know is that these terms are used by those writers who organize learning and teaching in terms of the *bond theory* (Problem 2, Unit I). As indicated in the foregoing pages, these terms can doubtless be reduced to rough equivalence with other terms, such as are used in this volume, for example. It may be that this is neither necessary or desirable. To attempt to define them thus, in terms of other theories of learning, is to risk confusing two modes of thinking about learning. This confusion is apparent in a few carelessly written discussions of learning and teaching now available.

Parallel Readings for Problem 7

1. Kilpatrick, W. H., *Foundations of Method* (Macmillan Co., 1925), Chs. ii, iv, v, x.
2. Thorndike, E. L., *Educational Psychology, Briefer Course* (Teachers College, Bureau of Publications, 1914), Ch. vi and also Part II.

Questions for Summarizing and Testing on Unit II

Any one who understands unit organization will have recognized that the problems in this unit are themselves unitary. This will be true also of the three remaining units in the volume. Unit learnings, understandings or attitudes, are therefore to be derived from each problem, as well as from the larger unit.

Beware of the error of designating the smaller units as "subunits" or "parts of the larger unit." They are neither, but are units in their own right. Beware of the attendant error of regarding the unit learning, the outcome for the large unit, to be a summary of the items derived from the smaller units. The understanding to be derived is a different one and is not a mere summary of the other learnings.

1. An excellent test of understanding is to write out in succinct, organized terms the understandings to be derived for each of the small units and for the larger unit.

2. Students may be asked also to list the skills and abilities used in studying this unit which should be of value to them in further studying or teaching.

CAUTION: Answers which merely review or summarize content are not acceptable.

NOTE: This type of test should be given together with others devised by instructors at the conclusion of each succeeding unit. To save space the questions will not be repeated after later units.

UNIT III

THE LEARNING TYPES AND THEIR DIRECTION

As indicated in Unit I we can distinguish a number of types of learning. Each has its own processes and problems. In Unit II were set forth a number of general considerations affecting any type of learning. The proper direction of the types of learning to be presented in this unit depends in some measure upon recognition, understanding, and use of these previously presented general factors. Some of them will be used constantly and prominently, others neither frequently nor weightily. In some cases the use is obvious and easily seen, in others some explanation will be necessary.

The chief value to the teacher of knowledge concerning the effect of *age* on learning should be to make her sensitive to the varying levels of maturity, hence to varying apperceptive backgrounds, varying levels of mental and motor skill. Age as a factor in learning tends to complicate teaching rather than learning.

Similarly, the teacher should adapt the difficulty and complexity of her units, lessons, questions, requirements, to the *individual differences* manifest in any given group of learners. This will involve adaptation to intelligence, speed, temperament, interests, information, learning type, etc.

Knowledge that learning responses to a given situation are *numerous and varied,* that many factors affect the learner in addition to the teaching procedure, should make the teacher sensitive to the *entire* teaching situation instead of merely to assignments and questions. Learners

react to these but also to the physical surroundings, the myriad personality traits of the teacher, her moods, dress, habits, etc.

The remaining three general factors may be discussed together. It was learned in the previous unit that learning is an *active* process, that this activity must be aroused and directed (*motivated*) if it is not spontaneously existent, that the learner's *past experience* and present frame of mind vitally affect the nature and outcomes of learning. These three things are fundamental and affect every learning exercise of whatever nature. Stating these points in terms of the teacher, it is apparent that for all types of learning the teacher must arouse (or utilize) existing activity, and must prepare the learner when necessary by calling to focus the proper background or mind-set. She must secure clear, undivided attention to, and interest in, the lesson, either by appealing to the instinctive interests of the pupils, or by bringing them to a realization of their need of the outcome desired. In appealing to natural interests she must be careful to see that attention is not directed to other phases of the subject than the one she wishes to teach. She must see that the pupil is not only interested but intellectually and emotionally prepared—is in readiness. This means that the proper background or set is present. If the learner or learners have no past experience related to the new, they are likely to make mistaken associations or to get mistaken notions. If she thinks the pupils do not have the information necessary, or if she discovers after the lesson is under way that most of them do not, she must supply the background as rapidly as possible. All of this culminates in the pupils' aim, the definition of the problem, the statement of what is to be done.

PROBLEM 1

HOW ARE MOTOR SKILLS ACQUIRED?

Exploratory and Pre-Test Questions

1. Stand before a mirror and try to wiggle your ears. Try this a few minutes before giving up. Keep accurate record of what you actually do in trying to learn to do this. What ideas or mental states serve as cues; that is, how did you try to start and control your actions? What instructions would you give another person if you were trying to teach him to do it?

2. Professional golf instructors are extremely particular about minute items of grip, stance, swing, etc. They insist that it be done "just so." Similarly, teachers of instrumental music extol the virtues of certain "methods" which must be followed to the most minute detail. On the basis of observation and experience, what do you think about it? Must it be done just so, or doesn't it make much difference in the end? (You can only cite the evidence of opinion at this stage but back that up as well as you can.)

3. A teacher directing manual activities worked hard and earnestly but complained of her results, "I don't know what's the matter—I explain and explain and explain, but of the three who do the best work, one is deaf and the other two don't understand English." Analyze this situation carefully. What should the teacher have learned from her own experience?

4. A batted ball was severely scuffed against a concrete wall in coming down. The pitcher noticed that he got a queer break or curve on his next pitch. He experimented a while and decided that it was the roughened cover that was responsible. He developed the idea and is credited with the evolution of a new curve. Could this discovery have come about in any other way than accidentally as above? What implications for teaching motor skills can be seen?

5. A small boy using a coping saw on a piece of woodwork broke the blade. He inserted another and another until he had

broken every blade supplied to that room. The teacher said it was all right for him to break the entire supply in trying to learn how to use it. Do you agree or disagree and why?

6. The chanteys sung by sailors in getting up the anchor have become famous. What other forms of motor activity are performed similarly? Would the chanteys and songs have anything to do with *learning* as well as *performing* the activity? What guidance for school tasks? Make specific application.

7. If you get off the track in running through a certain motor sequence such as tying a tie, making an intricate knot, opening a combination, etc., you are likely to go back to the beginning and run through again. If you forget in the middle, you are likely to go back and begin over. What guidance can be drawn from a consideration of these facts, both as to the nature of motor activities and as to methods of teaching?

8. Place a mirror on a table. Immediately in front of it place a sheet of paper on which you have drawn a two-inch square. (Have about a dozen sheets prepared, each with a square drawn on them.) Now place, or have some one hold, a cardboard screen of some sort over your hands so that you cannot see your own hands except by looking in the glass. Try to draw the diagonals in the square. Draw with ordinary speed; don't trace them cautiously.

Use up the ten or a dozen sheets you have prepared.

a. Write a brief but careful account of your learning process. Note the difficulties met, tricks you learned, ideas which helped or hindered, etc.

b. Write in organized detail the implications of your experience for the teaching of motor skills. That is, what guidance can you derive from this that might assist you in teaching others?

A very small boy was affording the guests of a resort hotel immense amusement though quite unconscious of his rôle as entertainer He was strutting up and down among the pine needles in front of the veranda pretending to puff on a pipe made of a pine twig with a cone on the end of it for a bowl. From time to time he pretended to strike matches on the seat of his diminutive pantaloons, occasionally breaking one and throwing it to the ground with appropriate imprecation. He tamped imaginary tobacco

into the bowl of his pipe, cleared his throat, and spat with adult precision. From time to time he peered around the corner of the hotel where his father and a group of men were making ready to go fishing. Most of them were smoking pipes, and, after careful observation, the youngster would add various points to his technique. He acquired considerable ability in doing what the men were doing. That is, he had acquired certain motor skills. Details aside, what are the elements in the process? In the first place, he had imitated a model, though his mother might disagree with the use of the word "model." He tried to do what he saw being done. He corrected his performance if it did not satisfy him. He corrected it by reëxamining the model. Observation of a model, trial-and-success imitation of that model, criticism, practice, seem to be the elements of learning. Psychologically, the boy had exercised sensori-motor learning, which consists in setting up connections between the sensory stimuli and desired responses. There are various types or levels of sensori-motor learning, but we need not be concerned with these here.

Much learning in school involves the acquisition of motor skills. Examples are to be found in handwriting, drawing, shop work, physical training, athletics, singing, pronouncing of foreign languages, manipulation of laboratory apparatus, etc. Motor skills are also involved in part in dramatization and expressive reading. Enthusiasts in some of the more æsthetic fields mentioned above may disagree that the imitation of a model is the chief thing involved in their work. Another school of educators will object to anything savoring of "imitation of models." But it is to be noted here, and it will be developed later that there is ample room for the expression of individuality and for legitimate variation within the limits set by the requirements of those models that exemplify the best methods of doing set things. Still other objectors may note that certain unusually expert

performers are untaught; they follow no models. The genius or other odd case does not concern us. We are discussing the average individual who can succeed only through instruction.

Steps in the process. What do people do in acquiring skills that are by their nature fixed and dogmatic? What are the steps one goes through in making the arbitrary associations into automatic reactions or in acquiring useful motor reactions? The first step is usually to get a clear and exact idea of what is to be done. This may be obtained from a book or other printed set of directions; it may be had from other people either by explanation or demonstration. In short, the learner gets clearly before him a model, plan, or formula which he attempts to imitate. He may, and probably should, participate in the setting-up of the model. He should certainly feel a need for the skill that is to be acquired. Even where the model is the crystallized result of experiment and experience he should be free to ask questions on points that are not immediately clear. During the imitation the teacher may give further instructions or demonstrations, may make verbal criticisms or lead the pupil to criticize his own results. In some instances improvement will come through trial and success, in others by volitional effort exercised directly upon the difficult part. This process of imitation and criticism is kept up until greater and greater facility is attained. Even after the model can be imitated with a good degree of accuracy, practice must ensue to make the association or skill automatic and permanent.

The steps in this type of lesson would then seem to be: setting the model, imitation, criticism, drill. These steps are not mutually exclusive but are interwoven rather intimately. In one case a step may be prolonged, while in another all the steps may be completed in a short time. Some teachers are misled by the apparent dissimilarity

of many school tasks and do not believe that the problems involved can be summarized in groups indicated in the steps set forth above. On analysis, however, does it not seem that the high-school boy learning to drop kick and the high-school girl learning to hemstitch present to the teacher a series of similar problems? Coach or teacher sets before the learner what is regarded as the best and most economical method of procedure, that is, sets the model. The learner then imitates and is corrected by demonstration or verbal direction. Practice follows until facility is gained. Undoubtedly the two models will differ completely; there are all sorts of variations in detail, but the task of the teacher in each case is to find and set before the learner the very best way of doing the thing. Criticism and correction of the learner's attempts must then be made in accord with psychology as applied to the particular task in hand. The teacher's knowledge of apperception and individual differences and her understanding of children's interests and motor development are all called into play. But however intricate and different in detail the processes may be of teaching people to give expressive readings, to bunt a baseball, to copy a painting, or to build things on the sand table, the problems in each case can be organized into related groups and summarized under the steps set forth above. The questions relating to finding and setting the model, to criticizing the imitation, to direction of trial-and-success learning, to verbal directions and actual demonstrations, will send teacher and coacher alike on the search for the answers that apply in the particular fields involved. What, then, are some of the things that properly should be done in each of these steps? What procedures are evidence of good teaching and what indicate a lack of understanding of the process by the teacher?

Setting the model. It is sometimes argued that since the facts dealt with in this type of lesson are fixed and arbi-

trary, there is no need to recall old knowledge to aid in interpretation. It is further stated that because of the nature of the material, there can be little interest aroused and therefore little attention to motive and aim is necessary. As a matter of fact, the recall of old knowledge is very necessary and can very well be made to supply both understanding and motive. To make pupils keenly aware of their handicap in lacking a certain formula or skill is a good preparation for setting the model before them. Natural interests can be appealed to just as in the lessons involving thought. The mere statement to a lower-grade class that they are going to make May baskets to hang on the doors will, for most children, motivate an otherwise dogmatic exercise in paper-cutting and folding. Practicing expressive reading for the purpose of entertaining another grade is effective. Much material of this type can be worked into games of one sort or another, though care must be taken to see that the game really drills the association or skill being learned. Usually the aim, if one is stated, is merely a statement of what is to be done. It can be made to grow out of a discussion, however, as in the lessons involving reflective thought. As stated elsewhere, this aim must represent a felt need on the part of the pupils. That is, they must decide to acquire the skill.

In setting the model for a motor activity there are three questions, attention to which will materially aid the teacher. First, is there one best way of doing this thing, backed by good evidence, or are there several ways equally good? Second, shall the whole procedure be presented at once and the class required to imitate it in that way or may it be broken up into parts for special attention? Third, how much use shall be made of actual demonstration of the skill and how much of verbal directions?

1. Best methods. In most fields the experience of experts indicates that there are certain ways of doing things

that are most effective and economical, though in music and drawing there is considerable disagreement as to these best methods. Individuals may be found who are certain that saws, planes, pens, needles, etc., may be handled in any of several ways, but there can be no doubt that energy is uselessly expended and time lost through lack of attention to this phase of motor learning. In addition, mistakes that do not educate the learner will be made in struggling with different methods in an attempt to determine the right one.

A danger in regard to this matter is pointed out by Thorndike: [1]

> A . . . danger in teaching form is to exaggerate the importance of some particular way of doing a thing and to spend much of the time and effort that ought to be given to concrete execution in insistence upon rigid adherence to some method. If we knew the one best way to write, the one right way to sing, and the like, the devotion of much time to form could well be pardoned. But in fact the way a child takes of his own initiative may be nearly as good a way for him as the method his teacher devotes weeks to enforcing. A moderate skepticism about methods of securing proper form in motor accomplishments is healthy. As in reasoning many different processes may all reach the same conclusion, so in motor skill many different ways of doing a thing may be equally good, one way being the best for some and another way best for others.

Much has been done since the above was written in 1905 along the lines of determining experimentally and by expert observation the best methods of performing certain acts, making necessary an even more "moderate skepticism about methods of securing form." However, two valuable points are included in the quotation. Many teachers devote so much time to insisting that margins be the requisite number of sixteenths of an inch wide on compositions and devote so much time to the position of the fingers

[1] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler, 1906), p. 221.

in writing that little writing is done. Secondly, the allowance for individual differences is vital.

Other things being equal, there are best methods. Wrong methods may be successful at first and up to a certain point but will inevitably handicap the learner in acquiring a high degree of skill. Furthermore, there will always be a few individuals who do things better by methods of their own quite different from the methods of the group. The average learner should approximate the method known to be good.

2. Whole vs. part of the movement. Ordinarily it is best to practice the whole movement at once and as a whole, though this seems in contradiction to everyday observation. In lengthy or complicated skills, however, it is often economical to break the model into several units or to isolate a part for special practice. Care must be exercised in this to see that greater damage is not done by setting up wrong associations which make it difficult to work the special piece back into the big movement.

3. Demonstration vs. verbal directions. The comparative value of these two factors is shown in the statement of the young teacher who was in despair over the failure of her class to do well in manual work: "I just can't get my pupils to do things right. I explain and explain but of the three who do the best work, two are deaf and one can't understand English!" Thorndike [2] says on the same point:

> The chief danger in teaching form is the neglect of imitation. There are so many things in school work which require explanation that a teacher gets used to explaining everything. But young children rarely, if ever, learn well such things as how to hold a pen, or to cut or to sew by being told how; they have to be shown how. This does not mean that understanding what they are to do, or even why that is the best way to do it, is not valuable. It is valuable for pupils to learn to follow directions about technique such as are given in books; *e. g.*, to comprehend why a certain position is taken in planing, or why deep breaths are

[2] *Ibid.*

an essential of good form in running or singing. But such learning is valuable more for the knowledge it gives than for its direct influence in improving form. Imitation of a concrete model is necessary to that end, at least with a majority of pupils.

Demonstration by the teacher is usually the most effective method of setting the model, but verbal directions are very helpful and, with some pupils, quite necessary. Pictures, diagrams, lantern slides, etc., are all helpful devices in demonstrating.

Examples. In demonstrating to a lower-grade class how to make a "cut-out picture" the teacher should be careful to turn partly away from the class and hold the model as it will appear to them as they work. Children have great difficulty in imitating a piece of paper-cutting, or other like work, when the model is held in front of the teacher. Even with the older children and adults this is an important factor. Many men in the army were cursed for stupidity by drill sergeants for throwing the gun across the body from left to right instead of vice versa when the fault really lay with the sergeant who was too ignorant to understand his own blunder in presentation.

In setting up a model to be copied, as in drawing, care should be taken that the light and angles are favorable to the class. Too much or too little light, glares, or shadows all alter the model materially. Perspective is also affected radically by the location of the model or the seating of the pupil. Placing several copies of the model in such cases will help.[3]

Imitation. After the teacher has set the model, or indicated the material to be memorized, and has checked to see that every one has a clear idea of what is to be done, the pupils attempt to direct their activity along the lines

[3] An excellent concrete discussion of good and bad ways to conduct such lessons as are discussed in this chapter will be found in F. M. McMurry, *Elementary School Standards,* pp. 27-41.

laid down. In directing imitation there are two questions for the teacher to bear in mind. First, how much trial-and-success learning should be allowed? Second, should the attention be on the objective result or upon the movement as it takes place?

1. Trial and success. As long as a pupil is progressing and learning through his mistakes, he should be allowed to proceed by trial and success. At the point, however, that the law of diminishing returns enters, that is, when mistakes are being made and time wasted without commensurate return, the teacher must redirect activity. A good deal of trial-and-success learning that would be inevitable in real life may be eliminated through correct setting of the model.

Thorndike points out that there must be some opportunity to make mistakes in order to teach the avoidance of them. Teachers who carefully safeguard their pupils from possible errors not only stifle real activity but also prevent the pupil from acquiring habits of caution, self-restraint, and inhibition of useless movements.

When activity is redirected by the teacher, it should be in such manner as to guide the pupil in finding and criticizing his own mistakes, rather than to point out the mistakes and demonstrate the correction. Of course, as a last resort with pupils who are getting hopelessly lost the correct method must be given outright.

It is to be noted that trial-and-success learning will differ materially depending on whether it is exercised upon a mental association or upon a motor skill. In the case of the mental association the model can be exactly perceived by the learner and imitated correctly rather early in the process. Correct repetition is then necessary to make it automatic and there will be little of error. Correction is gained by reference to the model. As a matter of fact, the adjective *trial-and-success* probably should not be ap-

plied to this type of learning. In the case of motor skill, however, the model cannot, technically speaking, be correctly perceived, or at first approximated by the learner. An extended period of progressive learning, or practice, then ensues, involving a good deal of trial and success, in which each correct response aids in inhibiting wrong responses.

2. Attention upon the result or upon the movement? A good summary in answer to this is found in Parker:[4]

> Ordinarily the learner's attention should be centered on the objective result of the movement, not on the movement itself. An elaborate analysis of the movements in terms of the anatomy and operation of the parts of the body concerned is generally a waste of time and often prevents the attaining of the best results. Musical technique and pronunciation furnish good examples. Occasionally explicit attention to the character of the movement seems to be helpful.

The routine factors involved in imitation should be given attention. All materials, tools, apparatus, etc., that will be used should be on hand and in place. Much time is lost and confusion invited by neglecting this phase of preparation for work.

It is to be noted also that the factor of rhythm in the repetitions will materially aid successful acquisition of skill.

Criticism. Many points regarding criticism and correction have already been made in discussing imitation. Obviously, both steps occur simultaneously in most cases. Sometimes at the end of the lesson there is a definite period of comparison and discussion concerning good and bad points. Good pieces of work should be commended as well as errors corrected. Often a piece of good work by a pupil is more efficacious in making clear what is to be done, or in correcting errors, than is discussion by the teacher.

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[4] S. C. Parker, *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), p. 119.

The teacher must work for skill in detecting the real nature of the difficulty whenever a pupil is in trouble. Then effort must be made so to direct the activity that the pupil participates in the actual discovery and correction of the error. The dominating principle in correction is that the teacher's efforts be directed toward the development of intelligent self-criticism by the pupil.

Insincere or incorrect praise will not help the learner. The judicious use of deserved commendation is distinctly stimulating.

Drill. After the motor skill can be exercised with a fair degree of accuracy, or the series of associations repeated, there must be a number of repetitions of the perfect process in order to make the activity or association automatic. This is the bugbear of school and is a learning process that has been overworked and misused probably more than any other. Great numbers of students have been discouraged and have disliked school because of the drudgery of drill. Teachers often abhor it, which does not make it easier for the pupils. However, much time and effort have been expended by psychologists and pedagogues in an endeavor to make this absolutely necessary and vital process more easily administered. Their experiments and theories have resulted in a body of information, formulated into principles, the understanding and application of which are a fundamental part of the teaching process. These principles are important enough and their discussion lengthy enough to warrant the separate discussion that will be found in later pages.

It should be remembered that lessons of the type discussed in this chapter are not the only sources of material that must be drilled upon. The generalizations, rules, definitions, etc., gained through lessons for that purpose, as well as important facts arrived at during problem-solving exercises, must also be made permanent by drill.

Limitations of this method. This method of teaching is easily perverted into a dogmatic setting of the model by the teacher, followed by slavish imitation on the part of the pupil. It can also be applied easily to material that should be taught by the more difficult lessons involving reflective thought. These perversions, very common in the past and still far too prevalent, have been responsible for much repression of individuality, much poor thinking, and much of the dislike of school by children. They have also been responsible for much bad behavior. The reaction against them threatened for a time to sweep imitation and memorization out of the school altogether. Many teachers go to the other extreme and believe in having no imitation and no drill. They argue that such facts as are now drilled upon can be acquired as well by incidental use. Experimental data show the futility of such procedure. This same group of teachers decry memory and would throw overboard all memorization of dates, locations, formulas, etc. This also is absurd; the point involved is not the non-use of memory but the proper use of it.

Applied to dogmatic, arbitrary facts, formulas, and skills, with proper care taken to safeguard individual variations and to provide for independent reactions, this method will be found justifiable and efficacious.

Instructors who fear the dogmatic implications of the terms "model" and "imitation" may substitute other terms if desired.

Discussion Questions for Summarizing and Testing on Problem 1

1. In a group of high-school boys training for the high jump, one who had perfect form jumped about four inches less than the boy who jumped the highest of all. The second boy, however, got over the bar in a cramped and awkward position. The coach merely directed the first boy to keep on practicing, but every day he criticized and scolded at the one who was really the highest jumper in the lot. Why?

2. A group of students is doing a cross-country hike. The day is hot, the packs heavy, and the route is a long rough one. Straggling and complaining begin. The leader begins to sing a popular and lively marching song. The group takes it up, strides lengthen, laughter returns.

a. What would have been the probable effect had the group been allowed to straggle home tired, hot, and crabbing about hikes?
b. What was the probable effect from the outcome indicated above?
c. Apply to any phases of classroom work you can.

3. Lord Northcliffe, when ordered to take up golf, soon quit the regular instructor who took him round and round the course. He obtained several dozen balls, and hired half a dozen caddies. He then practiced driving six hundred times in succession, the caddies returning the balls to the tee. He then practiced putting nearly a thousand times. He did the same with shots from the rough, from sand traps, from thick grass, etc.

a. Does this violate the rule directing the learner to practice the whole instead of the parts of a movement? Why or why not?
b. Where would parallel cases arise in school instruction?

4. It is proverbial that beginners at golf or tennis do better the first day or week than they do for a long time afterward. Improvement does not show for a long time; in fact, there may be regression.

a. Advance as many explanations as you can based upon what you already know about learning.
b. Advance as many implications as you can for teaching motor skills.

5. In a typewriting class the teacher's attention was attracted to a certain student. This girl typed a certain amount of work, stopped, removed the paper, destroyed it, and began over again. This she did seven times, making a mistake at the same point each time.

a. Explain as fully as you can.
b. What might the teacher have done?

6. A lower-grade teacher shows her children a beautiful, though simply made, Christmas gift. She suggests that parents are so good and kind to children that perhaps the children should do something in return. She then states that each will make

one of these gifts for his parents. This is followed by an accurate and detailed account of the process to be followed. Criticize in detail, telling why or why not you would have done as this teacher did.

7. If you are right-handed, try for some time to do simple things with the left hand; comb hair, sharpen pencil, butter bread, use spoon, etc. Note time required to make any progress, nature of mistakes made, lapses of attention, etc. What guidance for the teacher trying to assist pupils to acquire motor skills?

8. In the lower grades it is often customary to have children repeat in "make-believe" certain habits. They pretend to be brushing their teeth, washing their hands, chewing imaginary oatmeal. Is this silly business or an important device in teaching?

9. Another teacher suggests that the children make May baskets to hang on the doors, and shows several pretty baskets. Some children know at once which they wish to make; others wish to vary the models shown. Some are able to go ahead without help; others wait to be told exactly what to do. Some of them make blunders; others spoil material.

a. What will happen (good and bad) if the class is required to wait for directions from and inspection of work by the teacher?
b. What will happen (good and bad) if each is allowed to go on at his own speed and with his own ideas?
c. Make a definite list of suggestions for handling the situation.

Observation Exercise for Problem 1

Observe a group of learners who are being initiated into the learning of a new motor skill, or one that is in process of acquiring one.

General Question

1. Does the subject matter being taught demand the use of this type of teaching?

Teacher Activity

Setting the Model

1. Does the teacher "set the stage":

a. By bringing the class to a realization of their lack of, and need for, the skill to be taught? Utilize need already present?

b. By arousing the proper mental attitude, appealing if necessary to their instinctive interests? Utilize interest already present?

c. By the statement of a clear-cut, concise aim, indicating the line of activity for the coming period?

2. Does she set before the class, or assist the class in discovering for themselves what is generally accepted as the best method of procedure?

3. Does she break the model up into parts when necessary?

4. Does she demonstrate clearly and effectively what is to be done? Supplement with verbal directions when necessary? Take care that all see plainly? That all see the model as they will see it when they come to work on their own?

5. Does she check up carefully before starting individuals or the class to work in order to see if all know exactly what to do?

Imitation

1. Does the teacher discover quickly those learners for whom the common method is evidently not the most efficient? Does she skillfully adapt procedure to them?

2. Does she note the point at which trial-and-success learning has gone far enough? Does she redirect activity rather than correct directly? Does she correct directly when necessary?

3. Does she stress attention to the completed skill, rather than to details? Does she effectively stimulate flagging interest?

4. Does she have all materials, tools, apparatus, etc., in place and ready for use? Does she see that they are distributed, collected, cared for quietly and efficiently?

Criticism

Imitation and criticism go largely hand in hand. Group exhibitions and criticisms should supplement individual criticisms from time to time.

1. Does the teacher manifest skill and insight in detecting the real difficulty when a pupil is held up or stopped? Does she inquire into his ideas and processes?

2. Does she so criticize as to lead learners toward intelligent self-criticism and self-analysis?

3. Does she use praise and commendation aptly; condemnation and reproof when and where necessary?

Drill

See outline at close of Problem 1, Unit IV

Pupil Activity

Setting the Model

1. Do the pupils ask questions freely, showing their realization of the lack of, and need for, certain skills? Do they suggest learning them in order to be able to proceed?
2. Do they ask to be shown how to use certain tools? To make drawings? To play desired games? To make necessary measurements and computations?
3. Do they suggest ways and means of learning and practicing the new skills?
4. Do they break the model up of their own accord if it is too large for mastery in its entirety? Do they adapt it freely to their individual capacities?
5. Do they ask further explanations if they do not understand? Call for demonstrations? Avoid, however, too many detailed questions?
6. Do they restate the aim in clear-cut fashion, or tell what is to be done?
7. Do they arrange tools and materials in a businesslike manner, and get ready to start work? Avoid, however, undue precipitancy in proceeding before the model is clearly understood, or before their own ideas as to what they wish to do are clarified

Imitation

1. Do the pupils actively attack the skill to be acquired? Avoid undue dependence on direction from the teacher?
2. Do they try out methods of procedure confidently? Go at it again after making an error? Try to find new ways to proceed? Avoid giving up after a blunder?
3. Do they detect their own errors? If so:

a. Do they rectify the mistake, learning by means of it?
b. Do they, if necessary, seek aid from classmates or teacher?
c. Do they avoid trying to cover up, or slip by with poor or incorrect work?

4. Do they practice voluntarily by themselves or in groups? Ask permission to practice together in small groups?

5. Do they seek aid from the teacher when necessary, but avoid asking too many questions?

6. Do they suffer the handicap of poor methods previously learned? Do they attempt to work over into new ones? Do any refuse to give up the old procedure?

7. Do they stop and organize a fresh start if they become confused, mixed up, lost, or rattled? Look for a cue from the teacher, or in the work of classmates? Avoid sulking, crying, or giving up?

8. Do any seem afraid to ask more directions or help? Do any seem uninterested and doing poor work?

Criticism

1. Do the pupils tend to stop work occasionally and inspect what they have done, or study their methods?

2. Do they help each other voluntarily? Ask for criticism of their own work to be made by classmates or teacher? Do they analyze helpfully the mistakes in a piece of work held up by the teacher for criticism?

3. Do they avoid careless, laughing, or sneering criticism of each other's work? Avoid laughing at, or making fun of, those who are not expert?

4. Do they avoid unfair praise of a friend's work, or unfair condemnation of an unpopular pupil's work?

5. Do they profit by their own and each other's mistakes?

6. Do they comment on the degree to which their work approximates the desired best method or model? Approximates the best work done by a pupil?

7. Do they use standard scores in the formal skills as a goal? Work toward them? Do they use writing scales, drawing scales, etc., as measures of the excellence of their work?

8. Do they try for further improvement after the standard score or scale value has been reached? To keep their work up to the standard?

Drill

See outline at close of Problem I, Unit IV.

Parallel Readings for Problem 1

1. Colvin, S. S., *The Learning Process* (Macmillan Co., 1911). Good discussion of trial and error and of imitation, pp. 10-23.
2. Freeman, F. N., *How Children Learn* (Houghton Mifflin Co., 1917), Ch. viii. Excellent.
3. McMurry, F. M., *Elementary School Standards* (World Book Co., 1914). Ch. v contains excellent reports and illustrative lessons.
4. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. v.
5. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Ch. xxiii.
6. National Society for the Study of Education, *Eighteenth Yearbook,* Part II (Public School Publishing Co., 1919). Excellent summary statements.
7. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Chs. vi and viii. Excellent discussion.
8. Thorndike, E. L., *Principles of Teaching* (A. G. Seiler, 1906), Ch. xiv.

Note: Ideally, only the general principles of lesson-planning should be included in a general-methods course, details being reserved for the training-school staff, or the special-methods courses. In many schools, however, the general-methods course must bear a major responsibility for training and practice in planning. In such event instructors may wish to turn now to Problem 6, Unit V, and discuss this topic, so that construction of plans may be begun here and carried on in connection with each of the learning types.

PROBLEM 2

HOW ARE CLEAR-CUT IDEAS (PERCEPTS) ACQUIRED?

Exploratory and Pre-Test Questions

None. Proceed to study of text.

A baby learns what his rattle is through handling it, reaching for it, lifting it, dropping it, hearing it, seeing it, perhaps tasting it. All of these experiences are necessary to a complete and accurate idea or percept of the rattle. But the baby is not concerned with acquiring a percept of the rattle, or with consciously exploring the object. He is interested in playing with and enjoying this odd device. Incidentally, he learns what it is and can always recognize it. When he is a little older, the baby learns what a ball is by dropping it, squeezing it, rolling it, seeing it roll away, seeing it bounce, etc. A few months later the child learns what his "kiddie-car" is by sitting on it, running about on it, falling off it, getting it caught in narrow places, etc. Rarely, however, is the learner concerned with the acquisition of these recognitions. He is pursuing other purposes and acquires his percepts incidentally. Thus one acquires a vast store of perceptions of persons and objects in the world. The range of these perceptions is from simple recognition of objects to recognition of words in reading and later to complex symbolic representations in stenography, mathematics, and the sciences. The whole school range is concerned with the problem. On the upper levels it is a matter of conscious concern and not incidental as with the child.

The adult often overlooks the fact that these things are *learned,* so accustomed is he to taking them for granted.

Observation of learning, however, shows clearly the acquisition in process. A child who has a dog and who is quite familiar with it but with no other animal is likely to include as dogs, his first cats, rabbits, and even a Shetland pony. His percept is progressively refined by experience. Much of teaching is concerned with the building of necessary percepts.

This type of learning goes on at a tremendous rate in childhood. The activities and purposes of the child lead him to much incidental perceptual learning. The practical demands of his world insure accuracy. However, we are concerned with it at all levels. The foregoing extremely brief introduction indicates that some general statements may be laid down.

There are obviously two phases in perception: first, ready recognition of sensory stimulus; second, interpretation. In the latter phase we have our old friend apperception again. The sensory impressions are interpreted and understood in terms of material already in mind.

The first thing, then, is to secure ready recognition of stimulus, a clear-cut image. This seems to be largely taken care of by the natural activities of the sense organs. Attention and interest, of course, make recognition quicker. Sensory discrimination will depend primarily upon the normal acuity of the sense organs of the given individual. Formal sense training seems to help little if at all. It is subordinate to the later phase of interpretation. Hunters and Indians are not more clear-sighted than other individuals, but they know where to look for signs and how to interpret what they see. We all see about the same things, but what these things mean depends upon the individual's past experience and present interest.

Formal drill in sense discrimination not necessary. Both common observation and experimentation indicate that such drills are of little value. It is of much more value

to make sure that children are possessed of normal vision and hearing, etc. The necessities of their own purposes and interests will guarantee sensory recognition.

Use problems requiring the observation and manipulation of objects. We do not acquire percepts of persons and things merely by *seeing* them. A student may gaze long at an object and have no idea what it is. If he has to use the object or deal with the person he soon learns details of object and of character. Actual experience is essential. Perception which involves seeing and hearing is materially aided by manipulation, activity. It was noted also above that much perceptual learning is incidental. Some problem or purpose necessitates the exploratory experience which results in clear-cut percepts. The inference is plain. Give opportunity for the manipulation and use of objects in the pursuit of problems and purposes deemed worth while by the learner. The experience must be rich and must utilize as much *realia* as possible, pictures, objects, museum exhibits, demonstrations, etc.

The excursion to mill, factory, farm, store, forest, lake, or beach is another device for presenting new material which, like the laboratory, is badly misused. An unorganized excursion not only fails to give the pupil the material to be learned but has a detrimental effect upon routine and good order. Excursions should be used far more than they are but should be definitely planned to the last detail. The teacher should go over the ground beforehand and make sure that everything is ready. Signals and movements should be definitely explained to the children. Individual assignments to different children in addition to the general assignment for all will help in maintaining attention and order. There is more need for assigning carefully and exactly for an excursion than for a textbook lesson. When well organized the excursion is an exceptionally good teaching device, but the teacher who is weak in or-

ganization and routine should not attempt it. The matter is clinched by written reports afterwards or by oral discussion. The written reports must not be tasks or quizzes but expressions of pupil interest.

Direct attention to exploratory study at times. In many instances the incidental use of objects in the pursuit of problems will not insure complete knowledge. The progress of the chief line of thought can be turned for the moment upon details. Sets of questions designed to require and direct exploration can be given. New phases of the chief problem can be thrust forward requiring further study of the materials being manipulated.

Relation to the Herbartian formula. We may discuss briefly the relation of the Herbartian formula to perceptual learning. As noted in an earlier discussion, this plan of lesson organization was an attempt to get away from teaching isolated facts, and to give the learner instead organized and coherent knowledge. The scheme was designed to lead the learner first to clear-cut, accurate realization of specific things (percepts), then to aid him in building up a generalization (concept), rule, law, or principle that would include and explain the specific cases. The complete sequence was called an inductive lesson. Lessons aimed at perceptual learning only were often referred to by modern Herbartians as "inductive on the first two steps." The wording is poor but the meaning reasonably correct. Induction implies arriving at the general notion, whereas in perceptual learning we are concerned only with clear pictures and understandings of specific things. The proper administration of the first two steps gives this. A brief outline of the formula may assist in making this clear.

1. *Preparation*
   In this step or phase of the lesson, the class is "prepared" for what is to come. Interest is aroused, old knowledge

recalled, an aim set. When students are in the proper frame of mind, the lesson proceeds.

2. *Presentation*
   In this step students examine specific examples, cases, illustrations. Discussion is centered on clear understanding of these. Reading, pictures, excursions, etc.
3. *Comparison*
   This step is often called "association" or "abstraction" as well as "comparison." The specifics are compared and the elements of likeness abstracted and associated to form the new general notion or concept covering them.
4. *Generalization*
   In this step the principle, rule, or concept is stated and refined. This is the end of the inductive process.
5. *Application*
   This is a drill or problem-solving step depending on the nature of the generalization. Knowledge has been developed in the preceding step. This step is designed to clinch and further clarify the knowledge through attempts to use it.

This brief summary will suffice here. A detailed discussion of this famous and still valuable formula will be given in Problem 4A of this unit.

The object lesson. Probably the most widespread example of direct attempts to teach percepts, is the object lesson. The history of pedagogy shows this lesson to have had a spectacular and somewhat checkered career. Omitting detail, it may be said that the object lesson originated with the worthy aim of relating school processes more closely to real things. It degenerated in many cases into so-called training of the senses and memory. The study of objects or activities in their proper relations, and as parts of a larger thought process, is valuable, and has been too often lost to sight. The following is a concise summary from Earhart:[1]

[1] L. B. Earhart, *Types of Teaching* (Houghton Mifflin Co., 1915), p. 71.

Since the objects studied must be related to knowledge already possessed in order to be understood and since the ideas gained are derived from the analytic study of the material itself, the object lesson involves the first two steps of the inductive lesson—the steps of preparation and presentation. Frequently the knowledge gained from the study of the concrete material and processes is used as a basis for comparison, generalization, and application, and in that case all of the formal steps are employed. Many times a single form—as a stream, a mountain, a plant, or an animal—is studied thoroughly, and is then made to serve as a type for similar objects, thus furnishing the core for later comparisons and generalizations. The teacher may never attempt to base a general conclusion on the object studied, but, through the natural tendency to reason from the concrete to the abstract, the pupils in the course of time may of themselves use the results of the object lessons to derive classifications, explanations, or laws.

Object lessons, properly handled, are still legitimate and important aids in teaching nature study, geography, history, hygiene, and other content subjects.

The type method. The word *method* is a misnomer here, since a device and not a fundamental learning type is referred to. The proper, though more cumbersome, statement would be "the use of types in teaching." As psychologists point out, the mind naturally generalizes almost at once. Logically, we should suspend judgment or generalization until sufficient examination has been made of several illustrations, but psychologically we do not do so. Crude generalizations are formed quickly upon meeting the first example of a class, species, genus, etc. Such judgments are, of course, reformed by the intelligent person as additional data are gathered and analyzed. This natural tendency of the mind is used in the type method of teaching. The type lesson is, in reality, the so-called inductive lessons in which general notions and concepts are acquired, but a lesson in which only one example is given during the presentation step instead of several. This example is chosen because it is a type and represents fairly and rather

fully all that could be learned by studying other cases in the same class. Typical cities, modes of transportation, geographical regions, governmental schemes, industrial management, classes of flowers, species of animals, etc., all afford opportunity for the use of this method. The step of comparison is obviously absent, and generalization need not be formally present. A generalization will usually be formed without effort, though the teacher may call attention directly to the fact that the typical example studied truly represents all others in the class. Care must be taken to see that the example selected is truly typical, and that the study is complete and well organized.

Obviously a great amount of time will be saved through the use of types in teaching, since much material in the content subjects—particularly history and geography—may be handled in this way.

The relation to perceptual learning is clear. Whatever the relation of the type method may be to complete inductions, the students must, of necessity, gain very clear ideas of specific things because one example has been studied intensively, instead of several in a hurried and unorganized way.

Parker's suggested procedure. The pupil's acquisition of clear, vivid, usable ideas will be furthered, says Parker,[2] by utilizing certain learning activities and by adhering to three rules. His list of learning activities includes the following:

1. *Observing* real social situations and materials, or pictures and models of these.
2. *Solving problems* arising from human needs, either as actually present in the pupil's experience or as imagined in the lives of historic peoples.
3. *Expressing* ideas of social needs or materials or processes through the following media:

[2] S. C. Parker, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923), pp. 211-233.

a. Playful *imitating* of social activities.
b. *Constructing* miniature objects and situations.
c. *Drawing* maps, pictures, diagrams, and graphs.
d. *Describing* experiences, objects, and situations.
e. *Composing* and *presenting* historical plays.
f. *Discussing* problems that arise.
g. *Organizing,* outlining, and reviewing the outcomes of their experiences.

4. *Reading* in textbooks and supplementary books, including adventure reading and historical research.
5. *Studying large movements* in history instead of chronological detail.
6. *Determining geographical influences* upon historical developments.
7. *Using the lives of great leaders* in social movements, to epitomize and symbolize great conflicts and developments.

His three rules are:

1. Appeal to or arouse some fundamental instinctive tendency, interest, or activity.
2. Provide first-hand personal experience with real objects, persons, and situations, or vivid representation of these.
3. Stimulate the pupils to elaborate and reflect upon their experiences from many angles and in many connections.

The principles and procedures involved in carrying out the first rule have been presented in Problem 2, Unit II. Chiefly useful under rule two, are such activities as observing, imitating, listening, and reading. Chiefly valuable in carrying out rule three, are problem solving, and the various forms of expression enumerated above.

Activity important. The past history of perceptual learning is marked by much dependence on *observation,* looking, passive absorption. The common idea of percepts and their acquisition seems to imply this nonactive absorption. In conclusion, then, we may stress again the importance of activity. Direct experience is vital, as it is in all forms of learning. Vicarious experience, reading, discussing the experiences of others, reflecting, is also of the great-

est importance, particularly when it is considered how small a part of the world of sense one may directly experience. The fundamental materials for understanding the vicarious experience must, of course, be in the possession of the learner.

Discussion Questions for Summarizing and Testing on Problem 2

1. Two high-school students are on the way home when one stops to examine the cracks in a concrete retaining wall. The other waits impatiently, urges his companion to come along, and finally asks why he is wasting time poking at the cracks. The first replies that he has just been studying the weathering of rocks by erosion, frost, etc.

a. Why had not the boy noticed these and similar cracks before?
b. What good did it do him to stop and examine these?
c. Relate definitely to as many phases of perceptual learning as you can.

2. Recall several occasions when you read of, or had particular places minutely described to you. Possibly, in one case, you later easily recognized the place described, but in another the description did not help you. Recall the experience clearly, reviving it as fully as possible.

a. Where nonrecognition resulted was the fault yours or that of the book or person describing to you? Analyze all the factors you can.
b. Do the same for recognition result.
c. In the example of nonrecognition, make suggestions which would aid one in giving or receiving the vicarious experience in advance of the direct.

3. Recall trips or excursions on which you were taken as a grade, high, or college student; a successful and an unsuccessful instance.

a. To what do you attribute the success of the trip which did accomplish its purpose? What did the teacher do in advance, on the trip, afterwards?
b. To what do you attribute the failure of the unsuccessful instance? What did the teacher do or fail to do, before, during, and after the trip?

4. Let some student who recalls it, relate and interpret the

tale of "Two Eyes and No Eyes," the two boys who went for a walk through the woods one afternoon.

5. Does taking notes at lectures, demonstrations, on trips add to or detract from the clear ideas you are to gain from the lesson? Do circumstances alter cases? Explain fully your reactions.

6. If possible, examine the working of some simple mechanical device, an electric bell, an alarm clock, inside of a door lock, a percolator, a fountain pen, simple wall thermostat, simple part of a typewriter or lawnmower. See how much of the operation you can discover without assistance from any one. Note old knowledge coming to your assistance. Note how some apparently simple things are not explainable, though you thought you knew just how they worked. Then get some one to explain parts you cannot understand or explain yourself. Preferably get some one to explain to you a complex mechanism, a carburetor, a gas engine cylinder, a transformer, etc. (direct not vicarious experience with the mechanism). Note and report on the process of giving clear understanding. Note good devices, weak spots.

7. Show that an individual might be given much training in sense discrimination and still possess very limited experience.

8. Draw some complicated geometric figure and then draw beside it a simple star. Ask an observer to gaze at the card for twenty seconds and then draw the whole affair on another card. Ask another person to do this but direct him to keep his gaze fixed on the star all the time. Compare results and interpret.

9. We often are deceived in starting to pick up large packages. Exerting what strength we think necessary, we nearly topple backwards because the large package is extremely light. Explain. What is the significance for teaching?

10. Arrange some cards with eight, ten, or twelve dots on each. On one card arrange the dots in regular forms and patterns. On the other card the same number of dots scattered irregularly anywhere on the card. Flash these quickly one after the other before observers, asking them to reproduce at once the number and arrangement of dots on the pairs of cards. Interpret results and explain bearing upon teaching.

Observation Outline for Problem 2

Since perceptual learning is carried on constantly, and ordinarily as a concomitant of other learnings, it is not ordinarily

possible to observe direct exercises having this type of learning for their sole purpose.

In a later discussion an observation outline will be presented for observing laboratory exercises that often contribute to perceptual learning.

Since the excursion is a common device and is mentioned in the present discussion, an outline for evaluating it will be presented here.

Evaluating Excursion Exercises

Teacher Activity

1. Is the place, activity, or organization to be visited worth observing?
2. Does the excursion illustrate or contribute to a larger issue in the pupils' regular work? If it is part of a project, is it well placed?
3. Is there a careful preparation on the subject-matter side?
   - *a.* Do the pupils know what they are going to see, and why?
   - *b.* Are they prepared to understand it?
   - *c.* Is an aim set up?
4. Is careful preparation made on the routine side?
   - *a.* Clear explanation of where to go, how to get there, how to conduct themselves while there, how to return?
   - *b.* All signals worked out and explained for moving class from place to place, gathering it together, etc.?
   - *c.* Has the teacher been over the ground beforehand and made sure of all arrangements?
5. Are there individual and group assignments in addition to the big aim for all? Instructions as to note taking?
6. Is there careful preparation for a summarizing lesson to be held on return, or next day, involving reports and discussion?

Pupil Activity

1. Do they contribute by questions and discussions to developing the reason for making the excursion?
2. Can they state clearly the reason for making the trip? State the details they will observe that are to contribute to clearer understanding of the problem under discussion?
3. Do they actively search for details and ask questions?

Avoid mere passive observation or amusement with obvious but unimportant details? Does the occasion seem to be one of business, or merely a holiday for the killing of time?

4. Do they coöperate while observing and combine efforts in the endeavor to get all the details and a clear understanding of them? Take notes?
5. Avoid interference with any process being observed or annoyance to workmen and operatives?
6. Can they restate the directions given them regarding conduct in going and coming?
7. Can they summarize and tell intelligently what they have seen? Do better than mere description? Can they relate it to the rest of their work?

Parallel Readings for Problem 2

1. Colvin, S. S., *The Learning Process* (Macmillan Co., 1914), Ch. vi.
2. Cubberley, E. P., *An Introduction to the Study of Education* (Houghton Mifflin Co., 1925), pp. 218-221, 240-242.
3. Freeman, F. N., *How Children Learn* (Houghton Mifflin Co., 1917), Ch. ix. Best available reference.
4. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. vi. Contains discussion of development of perceptual learning on into conceptual, but is good on perceptual learning.
5. Parker, S. C., *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919), Ch. viii.
6. ———, *History of Modern Elementary Education* (Ginn & Co., 1912), pp. 188-207, 232-336, 359-364, 439-441, 457-460.

PROBLEM 3

HOW MAY MEMORIZATION BE FACILITATED?

Exploratory and Pre-Test Questions

None. Proceed to study of the text.

It is obvious that *sensori-motor* learning, *perceptual* learning, and what is commonly called *memorizing* all have something in common. All depend upon remembered past experience, or memory, but there are technical differences. In *sensori-motor* learning, the association is between stimulus and movement, and there is little or no conscious recall in functioning. This is often referred to as motor or muscular memory. In *perception,* the connection is between stimulus and mental elements, and the interpretation is so immediate and automatic that there is no conscious recall of the remembered element. In fact, one rarely distinguishes between the sensation or stimulus and the interpretation. In *memory* proper, the connection is between mental elements, and there is definite conscious recognition of the fact that past experience is involved, that is, remembered. Memorizing, then, is the formation of associations between ideas in such a way that the sequence may be accurately reproduced.

Learning by memorization is so familiar that no extended introduction is necessary. Much school learning involves memorization of arbitrary associations, such as the sequence of letters in spelling, multiplication and addition facts, recognition of symbols in silent reading, dates and events in history, use of symbols in map reading, etc. Memorization of the logical type is to be found in the learning of poems, pieces of prose, parts in a play, etc.

The answer to the above question—how we may facilitate the process of memorization—depends somewhat upon the answer to another question: is the material to be memorized associated arbitrarily or logically? Is rote or logical memory involved? Examination of the processes involved, plus scrutiny of experimental results in the past, enables us to set down some general rules.

1. Examine the material to be memorized for thought content first. There has been much confusion and malpractice by older pedagogues in utilizing memory in learning. Obviously, arbitrary associations must be memorized by rote, acquired through continuous repetition. Forcing the pupil to learn by rote was the path of least resistance, and the method came to be applied to material which cried out for other treatment. Rote memory is necessary when material demands it, but cruelly wasteful and educationally detrimental when used upon material that is logical. Associations of the latter sort can be made into a system of thought and attached to already existing systems. A study of the thought content of the material should precede the actual memorization. This enables the learner to understand the sequence of ideas, and associate it with other ideas, thus setting up many aids to speedy memorization and ready recall. Material to be memorized may thus be studied by the problem-solving or appreciation techniques in advance of committing to memory.

If the associations are arbitrary, the learner may proceed to repetition with little preliminary survey, other than that necessary to bring him to a realization of need. The teacher's task then becomes the stimulation of interest and attention as the monotonous repetition proceeds.

2. Make the first study with unusual care. It is a common-sense observation, backed also by experimental proof, that first impressions are powerful and lasting. Wrong associations early formed are hard to break down and

seriously hinder the acquisition of correct responses. The reasons for this are fairly obvious. The learner brings to his first attack on anything a fresh interest, vivid curiosity. His attention is high and strong associations are quickly formed. It is essential, therefore, that clear understanding result from the first contact, be it through reading, hearing, or observing a demonstration. All false associations should be avoided as far as humanly possible. A carefully organized discussion lesson, as indicated in the preceding paragraph, in which learners participate freely, is a valuable preliminary here. Care should be taken also to see that false associations are not set up later as repetition proceeds. While disastrous at first, false associations are a severe handicap at any stage. This rule does not obviate the possibility of quick preliminary surveys to get the main points.

3. Distribute the practice repetitions over a period of time. Whether the material is arbitrary or has thought content which will aid in memorizing, repetition will be necessary to make the association or memory permanent. This drilling is the final process in several types of learning. Hence a separate discussion of practice will be found in Problem 1, Unit IV. The following brief discussion relates more specifically to drill in memorizing. The task of the teacher is to maintain attention and interest, to prevent monotony and carelessness.

The number and distribution of repetitions will differ with the material, the purpose, the age and temperament of the learner. Some people memorize much faster than others. To secure best results, repetition must be distributed over some length of time. The individual drill periods must be relatively short.

How long repetition shall continue, at what point a piece may be called learned, is determined partly by the purpose in memorizing. In any event learning must be carried

beyond the point where the material can be recalled immediately after a drill period. It must be carried on until the material is readily recalled after an interval of some length. That is, learning must be carried beyond the threshold of immediate reproduction.

4. Attention and interest must be maintained during repetition. In itself, repetition is monotonous. Attention slips. Interest lags. But the material will not be remembered unless attention and interest are kept at a relatively high pitch. This is a point applicable to all learning but particularly so to drill. It has already been discussed in Problem 2, Unit II, and will be discussed again in Problem 1, Unit IV.

5. Learn under some pressure. While it is well to start slowly, so that a clear and correct impression may be formed, it is not well to continue at too leisurely a pace. When the pace and interest become too slow and lackadaisical, learning inevitably suffers. The presence of some little pressure or urge aids in keeping interest and gives point to the labor.

On the other hand, pressure of the nerve-racking type upsets the learner and destroys learning. Merely to hurry, to exert pressure is detrimental. Rather the learner should feel that definite results are expected by a certain time and will be called for then. He should feel that practically all normal learners can accomplish the task within a certain time and that he should do likewise.

6. The method of correct recall should be used. The method of correct recall is involved when the pupil reads or studies the material and then attempts to recall it without assistance from the book or model. Many children and adults constantly deceive themselves by keeping their eyes on the printed page as they repeat the selection when testing themselves. Failing to distinguish between perception and memory, they are discouraged by the apparent lack of

power when independent repetition is attempted. This method of reading or studying, then looking away to recall will be difficult at first and may seem to be wasteful and disconnected, but in the end time will be saved.

7. Use the "whole" instead of the "part" method. Another memorization process that seems wrong to the beginner, is to learn by "wholes" instead of by "parts," that is, to learn the selection by reading or studying the whole thing and then attempting to recall as much as possible. It is astonishing how much more quickly a lengthy selection can be mastered by this method than by learning line by line, paragraph by paragraph, verse by verse. Attention is better, and wrong associations are not formed. In learning by parts, there is danger that the last line of a paragraph or verse will become associated with the first word of the same paragraph or verse, whereas it should be connected with the first word of the division that follows. When the selection is unusually long, there must be division into parts, but the same theory holds good, for these parts are in themselves complete wholes or thought units. Division into parts is of particular value with young learners. With too long units, they do not see progress and become discouraged, losing confidence in their ability to learn. Divisions should not be made arbitrarily by verses or pages; some may be two pages long, while others are but half a page. The experimental evidence shows that as many as six pages of poetry can be learned faster working on the whole six pages than by dividing it up into pieces. As stated above, the units will be smaller with children but the principle is the same. Nothing said above should be construed as preventing special attention being given to extra difficult parts.

Direct memorization vs. incidental learning. As noted elsewhere, there are some educators who profess to believe that drill of any kind is unnecessary. Learners will acquire

what is necessary through the practical demands of life. Since this is a general point applicable to all drill, it will be discussed at length in Problem 1, Unit IV.

Discussion Questions for Summarizing and Testing on Problem 3

None.

Parallel Reading on Problem 3

1. Colvin, S. S., *The Learning Process* (Macmillan Co., 1911), Chs. ix, x, xi, xii.
2. Freeman, F. N., *How Children Learn* (Houghton Mifflin Co., 1917), Ch. x. Excellent.
3. Grant, James R., *Acquiring Skill in Teaching* (Silver, Burdett & Co., 1922), pp. 209-212. Brief but excellent. Good set of theses for class discussion.
4. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. v.

PROBLEM 4

HOW MAY PROBLEM SOLVING SKILLS BE ACQUIRED?

Exploratory and Pre-Test Questions

1. According to the popular conception, Heaven is a place where everything is calm and peaceful. All desires are satisfied, no problems will annoy. For this reason, a prominent thinker states that thinkers will not be admitted, and if admitted would be quite unhappy! What is the basis for his humorous statement?

2. For a patient with a headache, a housewife advised the application of a hot cloth. The physician on arriving asked a number of questions, regarding habits, food, eye-glasses, etc. *Disregarding* the medical knowledge of the doctor, what difference is apparent in the two approaches to the problem?

3. Do fish sleep? The answer to this question is not important. The essential thing is an account of how you went about finding such answer as you got. Bring in a detailed account of everything you did in attempting to answer. [The instructor should prevent discussion from digressing to the question itself and keep attention on the process of answering.]

4. A college class of 126 students was given the following problem: "If 3 cats catch 3 rats in 3 minutes, how many cats can catch 100 rats in 100 minutes?" The following distribution of answers resulted:

No answer	11	33 1-3 cats	7
1 cat	12	34 cats	1
3 cats	16	100 cats	71
24 cats	1	300 cats	5
30 cats	1	333 cats	1

a. Why do you suppose there was such variation in the answers?
b. What is the value of such questions?
c. What is the value derived from answering (*a*)?
d. What is the correct answer? How did you get it? (The class will vary in answering as above. Wrong solutions should be given slowly and orally, illustrated on the board if

necessary. Analysis will show what is wrong with those who missed the point.)

5. In 1919, when D'Annunzio was active in Italy, some United States Senators read a newspaper report of the landing of American marines on the Dalmatian coast. For hours an indignant discussion engaged the Senate regarding the attitude to be taken should any Americans be killed by Italians—the discussion varying according to the League attitude of the political parties. Later official reports showed that the marines had been landed to protect Italians and had been publicly thanked.

a. What was wrong with the Senate procedure? Is this a common error with public bodies and average citizens?
b. What procedure should the Senate have followed?
c. Guidance for teaching?

6. A small boy dropped a quarter through a crack in a wooden sidewalk. The crack was too narrow for his hand to go through, the coin was too far below the sidewalk to be poked out with his knife. He could not lift the board. After fussing a bit, he looked around for a thin stick, put his chewing gum on the end of it and pulled the coin through the crack.

a. Analyze this incident into its elements. Prepare an accurate statement in your own words of what he probably thought in solving the problem.
b. Guidance for teaching others to solve problems.

7. While dressing, you break a shoelace. List five (more, if possible—thirteen have been listed by some students) courses of action which you might take.

a. Try to determine how you happened to think of each one, where did the suggestion come from?
b. What factors might eliminate some and require acceptance of certain solutions?
c. Guidance for teaching others to solve problems?

8. [This problem is localized at the University of Chicago, but is clear enough to be used anywhere. Instructors can make up local problems identical in elements.]

A student riding to the University on the "L" has four possible ways to end his trip, since the train parallels two sides of the campus:

First: Get off at 55th Street and walk a mile through Washington Park.

Second: Get off at 55th Street and take a bus to the University.

Third: Get off at 61st Street and take a street car to the University.

Fourth: Get off at University Avenue (seven minutes beyond 55th), and walk four blocks to the University.

a. List all possible factors which might vary the initial situation and affect decision.
b. By what process would the student arrive at a decision?
c. What experiences of the past would aid him?
d. Make a list of items which could be definitely determined and which would remain relatively fixed, aiding in future decisions?
e. Would solving the above problem actually, or theoretically as you are now doing, be of any assistance in solving other problems?

9. The two foregoing are simple problems. What fundamental difference would there be in the processes involved in such problems as choosing a life work, deciding to get married, deciding upon a complete change of occupation and residence, etc.?

10. For immediate peace of mind, it is much better to take the first suggestion which arises. Why then spend time in deliberating on problems? Is a hasty decision ever valuable? Ever necessary? How do you think one can be trained to make rapid but accurate decisions?

11. Was there any similarity between your thinking process in solving these problems, and the trial-and-success process used in learning a motor skill? Wherein alike? Different?

12. In Question 4, was there a mixture of "inner" and "outer" behavior? That is, was there any effort to solve the problem by sitting still and trying "to do it in your head," or did you go immediately to pencil and paper?

a. What difference do you think there is between people who try it "in their heads" first, and those who use materials first?
b. If you began by trying it in your head first and later went to pencil and paper, why did you do it? What benefit did you secure, if any?
c. Guidance for assisting others in learning to solve problems?

13. In working some of the above problems, was your work affected at all by various attitudes during your work periods? "Oh, that's easy, I can answer that one." "I should worry, some one else will be called on." "Why work so hard on the fool things

anyway." "I'd hate to be called on and not have an answer of some sort." "These are a lot of fun."

14. Did you notice any transfer of training from one problem to another? That is, did solving any one help you with another? If so, make specific statement.

A simple illustration of learning involving thought. A youngster about five years of age, traveling on a motor stage through the foothills of western Oregon, was intensely interested in the herds of cattle which were being brought down from the forests and mountain pastures. At intervals during the day, the stage had to pull out over the side of the narrow road to pass herds, varying from ten to fifty head of cattle, each accompanied by one or two men in the picturesque dress of cowboys. Each herd was the occasion for a volley of questions from the small boy, the principal ones being, "What are those men doing?" "Where do they come from?" "Who are they?" After several such inquiries, the lad's father told him that the men were called cowboys. Several minutes later this question came: "Daddy, are cowboys men what wears leather pants, and guns, and big hats, and has ropes on their saddles?" There were several more parts to the long and involved question regarding the nature of the cowboy.

Later in the day the owner of the cattle rode by with some of his men, and the boy immediately noted that this man did not wear "leather pants," and did not carry a rope. "Daddy, Daddy, there's one that isn't a cowboy!" The passengers enjoyed the ensuing argument in which the boy learned some of the less obvious essentials in the concept *cowboy*.

Now what had taken place? The child had been brought in contact with a number of illustrations, or examples; we might say he had had a number of experiences. He had crudely abstracted the outstanding features of the different cases and tried to make a general statement or definition

that would fit all cowboys. He had then applied his definition to a new case, presenting slightly different aspects, and had been forced to reconstruct the definition. In doing so, he solved a problem and bettered his general idea as well.

This incident illustrates well some of the phases of one of the most important learning processes. People learn definitions, laws, abstract meanings, etc., in just that way —by coming in contact with a number of illustrations or examples, eventually abstracting the essentials and forming a general statement. Sometimes the generalization springs into mind upon meeting the first example and is reconstructed as others are met. The most intelligent people deliberately suspend the process of generalizing until they can find other examples with which to check the first idea. Sometimes it is many months, or even years, until the idea is fully formed.

On the other hand, people learn to use their ideas and to check up their correctness just as the child did, by applying them to new cases as they are experienced. Sometimes as with the child the idea itself has to be reconstructed; at other times it fits and classifies the new example. Difficult instances of such generalizing and classifying give opportunity for problem-solving thinking involving analyses of new, strange situations.

One of the big tasks of the schools is to expedite these processes so that the individual may quickly and accurately learn many abstract meanings and definitions that in real life might take months, and which might then be inaccurate because of the long unguided learning process. The school must also afford opportunity for the learner to practice applying his ideas, and to practice analyzing situations preparatory to such application. How may the school do this? What are the essential steps involved in speeding up the natural learning processes? Many different answers have been made to these questions.

The movements of thought. In practically every textbook on pedagogy or general method, there will be found a discussion of two types of teaching, one called the inductive lesson, and the other the deductive lesson. The names are derived from the fact that induction and deduction are the names given to the two principal movements of thought. When an individual is considering a number of particular experiences or examples and trying to draw a general conclusion that will cover all such instances, as was the small boy above, he is said to be making an inductive inference. On the other hand, when he has one specific experience or example and a number of general conclusions, and is trying to classify the puzzling case under some known rule or principle, he is said to be making a deductive inference. The series of steps or procedures in arriving at a conclusion, or in applying one, is fairly clear and is fundamentally the same for all people. The details and circumstances may differ most materially and cause many variations in the big movement of thought, but the essentials remain the same. Based, then, on the movements the mind goes through in making inductions and deductions, there have been worked out teaching procedures that aim to give the pupil opportunity to exercise these natural processes in learning.

However, when one tries to follow a movement of thought through from beginning to end, he is struck, if he is good at introspection, with the great difficulty of clearly differentiating between the two movements. They persist in working together, now one and now the other uppermost. Every inductive movement involves deduction and vice versa. Furthermore, in his *Methods of Teaching in High Schools,* Parker [1] brings out a point that has evidently been overlooked by other pedagogical writers, since none of

[1] S. C. Parker, *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), p. 229.

them mention it: namely, that a careful reading of Dewey, *How We Think,* particularly pages 82 and 83, reveals the fact that Dewey's use of the term *deduction* is materially different from the average writer's interpretation of it. Taking Dewey as an authority in the matter, it would seem that the use of the term is unwise. This fact, together with the difficulty of clearly distinguishing between the two, has led Parker to discuss the lessons heretofore called inductive and deductive under the general heading, "Lessons Involving Reflective Thought." His treatment of lessons aimed at the acquisition of abstract meanings, while much better, corresponds in some measure to the older discussions of inductive lessons. His discussion of problem-solving lessons corresponds roughly to the so-called deductive lesson.

It must not be thought from the foregoing that the discussion of inductive and deductive lessons is clearly beside the point and a waste of time. Despite great improvement, school work will always have an element of the artificial and arbitrary in it, and the separation between induction and deduction made by most writers is, or rather was in its day, of value in that it provided teachers with a definite procedure that does in the main approximate the processes of reflective thought. After the next several pages that will include a discussion of modern problem-solving thinking and teaching, we will return to the Herbartian inductive formula and discuss its present usefulness.

A modern conception of problem-solving learning. An even better procedure than that advocated by Parker is the practice, rapidly becoming current, of utilizing Dewey's suggested outline of the thought process as an organization under which to treat all lessons involving reflective thought. As with Parker, the terms inductive and deductive are dropped, as is the rigid and formal distinction between the two lessons. Both are really phases of thought. In either

case a problem or question is to be answered, data are to be examined, and inferences drawn. In one case, the learner examines data which are specific and organizes it reflectively into systems. In the other, he examines data which are general in an attempt to fit some problematic specific into a known system of thought. The data differ, but the outlines of the process are similar. What, then, is the nature of this thought process that not only gives knowledge, but that is important to master in and for itself?

The Dewey analysis of thought. The classic discussion of the nature of thought is Dewey's from which a few paragraphs [2] are given. For the sake of emphasis, headings have been inserted and paragraphing changed a bit.

Origin in some perplexity. We may recapitulate by saying that the origin of thinking is some perplexity, confusion, doubt. Thinking is not a case of spontaneous combustion; it does not occur just on "general principles." There is something specific which occasions and evokes it. General appeals to a child (or to a grown-up) to think, irrespective of the existence in his own experience of some difficulty that troubles him and disturbs his equilibrium, are as futile as advice to lift himself by his boot straps.

Form a tentative plan based on analogous experience and prior knowledge. Given a difficulty, the next step is suggestion of some way out—the formulation of some tentative plan or project, the entertaining of some theory which will account for the peculiarities in question, the consideration of some solution for the problem. The data at hand cannot supply the solution; they can only suggest it. What, then, are the sources of the suggestion? Clearly past experience and prior knowledge. If the person has had some acquaintance with similar situations, if he has dealt with material of the same sort before, suggestions more or less apt and helpful are likely to arise. But unless there has been experience in some degree analogous, which may now be represented in imagination, confusion remains mere confusion. There is nothing upon which to draw in order to clarify it. Even when

[2] John Dewey, *How We Think* (D. C. Heath & Co., 1910), pp. 12-13

a child (or a grown-up) has a problem, to urge him to think when he has no prior experiences involving some of the same conditions is wholly futile.

Plan not accepted until carefully examined and criticized. If the suggestion that occurs is at once accepted, we have uncritical thinking, the minimum of reflection. To turn the thing over in mind, to reflect, means to hunt for additional evidence, for new data, that will develop the suggestion and will either, as we say, bear it out or else make obvious its absurdity and irrelevance. Given a genuine difficulty and a reasonable amount of analogous experience to draw upon, the difference, *par excellence*, between good and bad thinking is found at this point. The easiest way is to accept any suggestion which seems plausible and thereby bring to an end the condition of mental uneasiness. Reflective thinking is always more or less troublesome, because it involves overcoming the inertia that inclines one to accept suggestions at their face value, it involves willingness to endure a condition of mental unrest. . . . Reflective thinking, in short, means judgment suspended during further inquiry, and suspense is likely to be somewhat painful. . . . The most important factor in the training of good mental habits consists in acquiring the attitude of suspended conclusion and in mastering the various methods of searching for new materials to corroborate or to refute the first suggestions that occur. To maintain the state of doubt and to carry on systematic and protracted inquiry—these are the essentials of thinking.

Whewell's account of Kepler's thinking. Before summarizing the nature of thinking from the foregoing general account, let us examine the description of the actual thinking of a great thinker. Whewell's account [3] is based on Kepler's own detailed and self-revelatory account of his problem solving.

Bold guessing. Advances in knowledge are not commonly made without the previous exercise of some *boldness and license in guessing.* The discovery of new truths requires, undoubtedly, minds careful and scrupulous in examining what is suggested, but

[3] W. Whewell, *History of the Inductive Sciences* (D. Appleton & Co., 1901), Vol. I, pp. 291-292.

it requires, no less, such as are quick and fertile in suggesting. What is invention but the talent of rapidly calling before us many possibilities and selecting the appropriate one? It is true that when we have rejected all the inadmissible suppositions, they are quickly forgotten by most persons, and few think it necessary to dwell on these discarded hypotheses and on the process by which they were condemned, as Kepler has done.

Reasoning on many errors. But all who discover truths must have *reasoned upon many errors* to obtain each truth; every accepted doctrine must have been selected out of many candidates. In making many conjectures that on trial proved erroneous, Kepler was no more fanciful or unphilosophical than other discoverers have been. *Discovery is not a cautious or rigorous process in the sense of abstaining from such suppositions.* But there are great differences, in different cases, in the facility with which guesses are proved to be errors and in the degree of attention with which the error and the proof are afterwards dwelt on. Kepler certainly was remarkable for the labor which he gave to such self-refutations and for the candor and copiousness with which he narrated them; his works are in this way extremely curious and amusing and are a very instructive exhibition of the mental process of discovery. But in this respect, I venture to believe, they exhibit to us the usual process (somewhat caricatured) of inventive minds—they rather exemplify the *rule* of genius than (as has generally hitherto been taught) the *exception.* We may add that if many of Kepler's guesses now appear fanciful and absurd, because time and observation have refuted them, others which were at the time equally gratuitous have been confirmed by succeeding discoveries in a manner which makes them appear marvelously sagacious, as for instance, his assertion of the rotation of the sun on its axis before the invention of the telescope. Nothing can be more just as well as more poetically happy than Kepler's picture of the philosopher's pursuit of scientific truth, conveyed by means of an allusion to Virgil's shepherd and shepherdess:

> Coy yet inviting, Galatea loves
> To sport in sight, then plunge into the groves;
> The challenge given, she darts along the green,
> Will not be caught, yet would not run unseen.

Devising tests for false suppositions. We may notice as another peculiarity of Kepler's reasonings the length and laboriousness of the processes by which he discovered the errors of his first guesses.

One of the most important talents requisite for a discoverer is the *ingenuity and skill which devises means for rapidly testing false suppositions* as they offer themselves. This talent Kepler did not possess; he was not even a good arithmetical calculator, often making mistakes, some of which he detected and laments, while others escaped him to the last.

Willingness to abandon false hypotheses. But his defects in this respect were compensated by his courage and perseverance in undertaking and executing such tasks; and, what was still more admirable, he never allowed the labor he had spent upon any conjecture to produce any reluctance in *abandoning the hypothesis as soon as he had evidence of its inaccuracy.* The only way in which he rewarded himself for his trouble was by describing to the world in his lively manner, his schemes, exertions, and feelings.

The nature of problem solving. From Dewey's account we see that there must be (1) a perplexing problem recognized as such by the thinker, (2) suggested solution or solutions, (3) development and examination of these hypotheses, (4) corroboration or refutation of the suggested solutions (verification). Equally important with the process are the attitudes which accompany it, namely, attitudes of (1) suspended judgment, and (2) critical evaluation. Lastly the process must be systematically organized.

From Kepler's account we can add other important characteristics of thinking. There must be (1) bold guessing as to hypotheses, solutions, etc., even though this involves (2) much erroneous guessing, "scrapped thought." This latter point indicates the necessity of (3) devising tests to check upon guessing (inferring). Lastly, a thinker (4) must be willing to give up ideas which will not hold water, no matter how long he has held them, or how well he likes them.

The guidance of problem-solving learning. With an idea of problem-solving thinking derived from the foregoing brief account, we may turn to the problem of aiding the pupil to exercise his thinking ability. A classic de-

scription of teaching to think is found in Thorndike's simile likening the guidance of thinking to the guidance given a child who is trying to find the road to his grandfather's farm. Says Thorndike:[4]

You must make sure (1) that the youngster knows what place he is trying to reach and (2) keeps it in mind; (3) he must also at least know that to get to a place (or to solve a problem) he must keep going and not lie down or go to sleep; (4) he must have some knowledge of the direction in which the house lies and of the roads and woods and valley in the neighborhood.

He starts off correctly and at a crossroad (or alternative in the problem) turns to the left.

"What did you do that for, John?" [asks the guide] "I don't know." "Where are you going?" "To grandpa's." "Where does that road go?" "To the schoolhouse." "Is that on the way to grandpa's?" "I don't know." "What comes after the schoolhouse if you go down this road?" "The church." "How long does it take to go from grandpa's to the church?" "Oh, a long time." "Is grandpa's near the church?" "No, it is a long way." "This road goes to the church. Is it a good way to go to grandpa's?"

If your boy is bright enough, he now turns to the right, but soon comes to the end of the road (or the suggestion that is being followed in trying to solve the problem). "Where do I go now?" says he. "Where do you think?" "I think we go through that field." "Well, try it and see."

You rapidly approach a pond (or discouraging difficulty in the problem) and the boy sits down and cries. "I can't find the way to grandpa's." "What's the trouble?" "You can't get around this pond, it's all swampy." "Do you have to go around it?" "Yes, grandpa's is up there and you have to go around this pond." "Go and look at the pond (or examine the difficulty) and see if you can find something that will help you to get to grandpa's."

And so on, with constant stimulation to the examination of each situation confronted, and with the selection and rejection of ways in the light of knowledge and of their consequences, until grandpa's house is reached, or until the problem is solved.

The steps in the process. As stated earlier in this dis-

[4] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler, 1906), p. 150.

cussion, whether we are analyzing specific cases, or gathering general data, the central process is reflective thought and the procedures are, in outline, about the same in either case, namely, gathering and evaluating data drawing inferences with which to answer problems. In some circumstances both phases of thought occur in the same problem. The problematic individual must be studied and analyzed most carefully, while several generalizations are experimentally applied. Such problems as "Why is it cheaper to ship by water than by rail?" introduce pupils to principles and laws that are unknown to them, though more or less obvious to the adult. Another of the same nature would be, "Why can New Zealand sell butter more cheaply in Portland, Oregon, than can the Oregon dairymen?"

As indicated in the Dewey analysis, general answers to those questions are likely to come to mind at once. The individual then casts about him for information with which to disprove or uphold his hypothesis. He may examine the problem closely, or he may turn to his own past experience, or he may examine any promising source of information. As stated before, the poor thinker is satisfied with the first information which comes to hand, or with a haphazard solution which brings him to grief later. The good thinker suspends judgment, even in the face of seeming certainty, until further analysis and search can be made. The implications for teaching are obvious. The inspection of the problem, the gathering of data, the formulation of probable outcomes go hand in hand, no line being sharply drawn between the three. The systematic organization of data as they are discovered and applied narrows the search more and more. In those examples of verification that involve gathering still more data, this fourth step is intimately interwoven with the others. When it involves experimentation, or the analysis of implications, it may be set off more sharply. The teaching of problem solving may

be organized then into the guidance of four steps, phases, or processes; setting the problem, inspection, inference, verification. All that has been said previously about flexibility and interrelation of steps in any learning process, is of the greatest importance in the present instance. In some of the former lessons, the phases or steps can be made to stand apart with some clarity, but in problem solving, the movement is, as Dewey calls it, "shuttle-like." There is constant movement back and forth, data are gathered, they affect the hypothesis, a little verification movement is started to confirm or eliminate the data, further search is made, and the process repeats itself. For this reason, there is great need of taking stock occasionally, for organization. Great care must be taken to be systematic, since all sequence and relation to the problem will be lost in complex cases unless outlines, graphs, tables, etc., are used to organize.

Setting the problem. This is the approach or introduction to the lesson. The older Herbartians called it *preparation.* Those who emphasize the pupil-centered lesson name it *purposing.* The terminology matters little, the nature and objective of this phase, together with the teacher's attitude during it, are important. In this step or phase, the class is brought to a clear realization of the problem, interest is aroused, old knowledge recalled, and an aim stated. The class is in readiness. All this has been presented in detail in the various problems in Unit II. We need merely reëmphasize here the necessity of keeping the pupil's problems, purposes, or motives, central. "Setting the problem" must not be interpreted to mean that the teacher both proposes and disposes. She may guide, stimulate, "set the stage," but the learner must clearly understand the problem and whole-heartedly desire to do it.

People differ widely in ability to define a problem and keep it in mind. One has only to listen to discussion of a motion in a committee, club, faculty, or city council, or

to read the Congressional Record to realize how muddled ordinary thinking is.

There is first the group who do not or cannot see problems. They do not think, and doubtless cannot be trained to do so. Everything is going well, things are all right as they are. Disturbances, breakdowns, or other real problems are either naïvely refused recognition, or rationalized out of existence. An experienced grade-school principal was very indignant when asked what her problems were. "I have none. I'll have you know that I have been a successful principal for twenty years, and have no problems." This poor principal does not even know the language of modern education, let alone how to direct a school.

The second stage is represented by those who feel in a vague and inexact way that something is wrong. "Something ought to be done about this." But the exact nature of "this" and of the "something" remains unknown. Being asked to systematically analyze and set forth "what is given or known," "what remains to be done," "how shall we proceed," is of assistance with these individuals.

The competent thinker sees and defines problems clearly and exactly. He tries consciously to locate them and to set them forth in definite language. He *diagnoses* the situation, and finds the problem.

The teacher will aid pupils in defining and keeping problems in mind by (1) setting good problems before the class for solution. Pupils thus learn the appearance and characteristics of good problems, can recognize them, and begin to imitate. Later she can (2) give them opportunity to practice stating problems growing out of their own desires and purposes. Some educators would put the second suggestion first. Learners can be taught to stay on the problem by (1) being held for implications when they insist on getting off the point. "Show specifically how that relates to the problem." "If what you say it true, then

how about ——— (force an application to an analogous or similar situation)?" The teacher herself can be (2) self-critical and self-analytic. As a last resort (3) the wandering learner must be told directly that he is off the point and that his contribution is worthless. A well-known professor is famous for his annihilation of long-winded and incoherent graduate students. After listening to a long vague dissertation, the professor asks quietly, "Let's see, did you make a point or not? If you made a point, see if you can state it in a sentence."

Inspection: *gathering and classifying data.* During this phase which overlaps, and is interwoven with the preceding and following phases, the problem is thoroughly inspected. This involves observation and analysis of the puzzling situation, together with a search for related information. The learner searches and organizes his own past knowledge. The teacher may indicate other sources, or the pupil may discover them himself: reading, consulting other people, studying pictures, graphs, statistical tables, etc.

It is often difficult to recall quickly and accurately all one does know relating to a given problem. However, certain aids to recall may be utilized. In the *first* place, similar cases or problems may be recalled and searched for guidance in the present problem. The teacher may often direct learners to related discussions. A *second* device is to deliberately direct attention to one factor at a time. This is what is meant by analysis in the psychological sense. Analysis, mentally, is not "picking to pieces" as some appear to believe. A mental presentation cannot be "picked to pieces" as we ordinarily think of picking to pieces. We can, however, focus upon one feature after another, each exclusively for the time being. This materially aids the recall of related material. Parker [5] says:

[5] S. C. Parker, *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), p. 188.

> The unskilled thinker will sit and stare at the problem as if he expected the solution to jump out at him. A better type of thinker will begin to break the problem up. . . . Instead of depending on the gross situation for suggestions, he will pick out now this aspect, now another, in hopes that correct suggestions may occur. By multiplying the sources of suggestion, he multiplies their number. By dividing, he conquers.

In the *third* place, the teacher can encourage pupils to "take a chance" after they have gathered as much data as they can. Here we have Kepler's "bold guessing." Even if unsuccessful, these guesses or hypotheses lead to fresh data. A series of hypotheses forms the basis for a systematic search for further data. This last suggestion is, of course, going beyond the data and commencing upon the development of solutions. Hence the next step.

Inference: developing a tentative solution based on the data. As noted in Unit II, learning responses are varied rather than single. Many associated ideas and inferences will arise in the discussion of any problem. This, as indicated in the immediately preceding paragraphs, can be stimulated and encouraged into "bold guessing." Dewey [6] says on the matter:

> Suggestion is the very heart of inference; it involves going from what is present to something absent. Hence it is more or less speculative, adventurous. Since inference goes beyond what is actually present, it involves a leap, a jump, the propriety of which cannot be absolutely warranted in advance, no matter what precautions be taken. Synonyms for this are *supposition, conjecture, guess, hypothesis,* and (in elaborate cases) *theory.* Since suspended belief, or the postponement of a final conclusion pending further evidence, depends partly upon the presence of rival conjectures . . . *cultivation of a variety of alternative suggestions* is an important factor in good thinking.

All the suggested inferences must be received with an open-minded but critical attitude. To "maintain a state

[6] *Op. cit.,* p. 75.

of doubt," to "suspend judgment," are fundamental in thinking. In stating that suggestions be received critically, we must guard against the error of interpreting this to mean that one must *object to,* or argue *against* all new ideas which arise. It is just as important to find points favoring the suggestions. Many teachers feel that if they can stimulate vigorous argument among students, good training in evaluation and criticism will result. Unfortunately, the average individual tends to argue for an idea that he has discovered or espoused, and against his neighbor's idea, as a matter of pride and not as a matter of the merit of the idea. A good deal of argument in life represents the absence of thought rather than its presence. Quibbling is not thinking and should be sharply corrected in class. On the other hand, the type of impartial, critical, debate which marks the scientist's reception and analysis of new suggestions is highly desirable.

How is the learner to be aided in learning to suspend judgment and to critically evaluate suggestions? *First,* the teacher herself must manifest suspended judgment and an open mind. A common fault in teaching is the dogmatic acceptance or rejection of student's answers. Another is to take a stand upon matters of policy or discipline and refuse to allow discussion. This tends to stifle any thinking that might be done and to engender the same arbitrary, dogmatic attitude in the learners. As far as time permits, the teacher must school herself to endure patiently the "more or less troublesome, somewhat painful condition of mental unrest," in order that the pupils may have a good example, and also the opportunity to think for themselves. *Secondly,* students may be brought face to face with conflict between recognized authorities, or with apparent contradiction in statistical or objective evidence. Realization of the apparent contradiction in fact, and analysis of it to find the true explanation are devices which

beget the critical attitude. *Lastly,* we may always discuss the critical attitude directly with the class, particularly with high-school and college classes. The egregious blunders of the average citizen in all walks of life afford ample and easily understood evidence of the necessity for suspended judgment.

Sometimes individuals are found who seem to suspend judgment so well that they inhibit activity and conclusion. This is not suspension of judgment but a volitional defect. All due caution must be exercised, but the practical world demands an answer eventually, even though the answer must be a partial one. Thinking is for the purpose of directing overt activity. When reasonable time has been allowed for gathering and evaluating data, one must "make the leap," draw an inference, come to a conclusion. If it turns out to be wrong, this is a lesser error than "suspending judgment" so long that no inference is drawn. The mind must be trained to avoid both impulsive and precipitate conclusions and also dawdling indecision.

As stated elsewhere, the steps or phases are interwoven rather intimately and cannot be separated except in simple problems and for short lengths of time. The making of inferences starts almost as soon as the problem arises. In fact, most people think of an answer first and then work to prove or disprove. The teacher's skill will be shown as she calls for inferences just when sufficient information is in sight to justify the procedure. The principle of self-activity is again prominent; the pupil must make the inferences himself, even though he plagues the teacher with seemingly irrelevant guesses and suggestions. Rather than reject these statements she should lead him to criticize them himself. Questions involving implications or verification of what has been said are good devices. The reduction of irrelevant suggestions to the absurd is more difficult, of course, with reflective thinking than with motor activity.

An interesting illustration involving both types of activity was found in a class making motor-boat models. One student was determined to make his boat his own way and would listen to no suggestions from any one. Visits to the river for the observation of larger boats aided the others but had little effect on this individual. Though he pursued his project enthusiastically and worked hard, his boat had one fatal defect when completed—it would not remain right side up when placed in the water. Thereafter, as the result of his experimentation, he was much better as a co-worker with others in the class.

The teacher must be on the alert for suggestions that are somewhat logically justified in the child's mind, but that do not aid in the work on hand. Such suggestions may be disposed of by explanation, instead of dogmatic rejection.

Verification. When an inference has been settled upon as the one most likely to be true, it should be proved. Sometimes verification is as simple as applying it immediately to a new situation similar to the one that produced it. Again, it may take as long to prove the hypothesis as to discover it. It may involve lengthy experiments, the gathering of many new data, writing of letters, consulting authorities. Reference may be made to books, other people, etc.

Brief illustrations of the foregoing statements. The concrete application of part of the preceding discussion can be seen in the procedure of the class that worked upon the problem stated above, regarding the price of New Zealand butter in Portland, Oregon. The pupils themselves evolved the method of inspection and suggested the following things for investigation: the climate, area available, labor costs in both places, supply and demand, transportation routes and costs, quality of product, laws relating to making and selling dairy products, laws relating to entry of products

from another country, etc. These, together with others suggested, were given definite problematic statement and assigned to, or selected by groups of individuals for examination and report. Magazines and books were searched, letters were written for bulletins or detailed information, reports made, and data organized and reviewed from time to time. Motivation was supplied for work in geography, both new and review, for oral and written composition, for reading and library work. The civics class was called into action during the discussion of laws and tariffs. An excellent piece of research was done with little guidance from the teacher.

Another problem, "Let us see if the land around Independence and Monmouth is suitable for growing sugar beets," was solved in much the same way. This was a real problem in the communities mentioned since an extensive hop industry had been eliminated and no one knew what to substitute. Samples of soil were taken from various fields of different elevations, exposures, and drainage conditions, and sent to the agricultural college for analysis. The method of sugar-making was reported in detail, together with the amount of capital necessary, the probable market, and a brief history of sugar-beet enterprises in the West.

Parker's five rules for guiding problem-solving learning. Parker[7] formulates guidance for the teacher, not in phases as above, but in rules of general application. All the points involved in his rules have been included above, with the exception of those relating to his Rule 5, *Keep the Discussion Organized.* Accordingly discussion of the others will be omitted.

1. Define the problem.
2. Keep the problem in mind.

[7] *Op. cit.,* pp. 314-330.

3. Stimulate suggestions.
4. Evaluate suggestions.
5. Keep discussion organized.

Keeping the discussion organized. As indicated again and again, it is essential to proceed in an organized and systematic way. Otherwise, the discussion wanders from the problem, irrelevant data are included, objectives are lost, biased arguments that waste time develop, and no outcomes are achieved.

One of the oldest devices for organization is the outline. With beginners it may be given to them, details to be filled in. The teacher may lead in developing an outline with the class. Even in the lower grades, learners may be given the opportunity to try outlining. When first graders are asked to give names (topic sentences) for parts of a little story, they are beginning to outline. Outlines have been grievously abused in teaching, particularly in high school and college. The wearisome construction of outlines for material already better outlined in text or reference is a waste of time and a cause of antagonism to the school. The construction of working outlines as the problem develops is an aid to thinking, the need for which is easily seen by all ordinary learners. Partial outlines, and sectional summaries will aid in taking stock occasionally, and in progressing systematically.

The use of tables, diagrams, and graphs is coming into its own in the schoolroom from the lower grades upward. Few more practical devices than tables and graphs can be imagined. Requiring their use is a distinct aid to the pupil, and in addition gives him a tool which he can use in later situations.

Some problems have inconclusive and unverifiable answers. Many teachers object to the use of problems to which there is no certain verifiable answer. They argue that time devoted to such problems is wasted either because

no conclusion can be reached, or because an untrue conclusion may be accepted and regarded as satisfactory. The latter situation is a serious handicap to thinking. The opposing argument is that life is full of problems for which, paradoxically speaking, there are no answers but which must be answered. That is, the march of events in daily life forces action upon us often when we really do not know which is the right course. We choose the course that seems best on the basis of data then available, and go ahead. Our course (answer to the problem) may have to be changed a number of times but this is itself the process of thinking from partial answer to partial answer. Furthermore, the thinking done on inconclusive problems is the same as that done on those that can be answered with mathematical precision. The training is good, the situation involved duplicates life situations. The real point involved is that the learner must know that some problems will permit of partial and inconclusive answers only. Such answers must not be accepted as final or satisfactory, nor as similar to answers which are precise. This, in itself, is a valuable attitude for the good thinker.

Freedom versus direction, individuality versus authority in thinking. In the field of teaching to think, the extremists on the side of pupil-centered lessons make their most vigorous stand. There must be no interference with pupil purposes and processes. The teacher draws her salary but evidently for keeping the register and regulating the heat and light. On no account is she to interfere with learning! Of course, the leadership in education contains no such extremists but no one can doubt that the rank and file contain many. Neither does the leadership now contain any who advocate a teacher-planned, teacher-dominated, teacher-regulated school procedure.

Is there need for training in both aspects, the proper use of freedom and initiative in thinking, the proper re-

spect for authority, the intelligent following of directions in thinking? Let us examine the facts of observation. It will be observed everywhere in school, from kindergarten to college, that some individuals manifest at different times and in different ways an astonishing lack of self-direction. They seem unable to proceed on their own initiative, or to do the simplest things without explicit direction. At the other extreme will be observed the individuals who manifest an impertinent independence, which in college develops into stupid arrogance.

The first type is illustrated by the children who seem unable to look up words unless directed to, to start work unless the directions are minutely explicit, to find a place to sit, stand, or work without being told over and over again. College students will often ask an instructor, "Now just what is it you want in the paper you have assigned?" They excuse failure with the wail, "Well, if I'd only known what you wanted, I would have done it that way." There seems to be no thought of initiative, independent thought, or expression of individuality. The school, of course, is in great measure to blame for this attitude, since much administration and instruction is of such nature as to produce just this condition. But it is a relic of the Middle Ages and of mistaken theological ideas regarding the nature of the individual. Studies of original nature, of individual difference and variation, have shown the vast importance of training the individual for what he is. The individual's contribution will be made in terms of, and because of, the particular talent or ability he may possess. Modern psychology and pedagogy have stressed this fact for some time now. Progress seems to be served by individual contributions. Individuality is a benefit to the group rather than otherwise. A very readable summary of this topic will be found in McMurry, *How to Study and Teaching How to Study,* Chapter X. There can be no doubt that

interest will be generated and work more keenly motivated, if there is provision for individual initiative, expression, and leadership. Accomplishment will be greater, habits and viewpoints valuable both in and out of school will be acquired.

But we have also the other side of the situation to deal with. The spoiled child is famous everywhere for impertinence to parent and teacher, for disregard of others' rights, and for inability to respect any authority in any line. An authority in psychology once addressed a college class on a difficult and little-understood phase of the subconscious, calling for class discussion afterwards. The first remark by a sophomore student was, "It stands to reason that a good deal of this isn't true." On another occasion, a college junior was assigned an article by one of the most eminent thinkers in America, and reported to his instructor confidentially, "The article is the bunk. The author must be a poor nut with a warped view of life." Another senior who had never taken psychology, had never heard of experimental psychology or of intelligence tests until he took one of the latter with his class, expressed himself at great length orally and in the college paper upon the absurdity of such examinations. All these students were blithely unaware of the extreme stupidity of their opinions. All around us are men expressing opinions, and acting upon them, in regard to affairs they do not understand, and never can. In street cars, in hotel lobbies, in offices, at social gatherings, everywhere that people meet, the humblest clerks will be heard expressing emphatic opinions in contradiction to experts who have worked in the particular field a lifetime. By some this tendency is mistakenly called "American independence." Certain it is that no other nation would claim it, and good Americans must disclaim it. It is not maintained that the expert is infallibie, but it can be maintained that in a difference of

opinion between the average citizen and the expert, the chances are probably one thousand to one that the expert is right. In a field where experts are available and have demonstrated their expertness, there is no occasion for so-called independent thinking by the average individual. However, no one wishes blind worship of authority, of dicta from above, or undue worship of the pronouncements of the oracle. The bad effects of unthinking acceptance of propaganda from *supposed* experts was thoroughly demonstrated during the Great War. The fact that it continues to be accepted uncritically is demonstrated by the absurd lengths to which advertising is being carried and the ridiculous statements which are the stock-in-trade of many advertising writers. Respect for authority can be perverted easily in furthering the selfish purposes of designing and unscrupulous leaders. The proper, necessary, and vital display of independent thought is to be exercised in discovering who the experts are, and what makes them expert; in analyzing the evidence set forth, and in determining whether pronouncements made are really made by experts, or by self-interested and sensational individuals posing as experts.

Between the two extremes, then, there is a desirable type of individuality, initiative, and independence which should be trained to the utmost. These traits are not manifested, however, as some seem to think, in impertinent difference of opinion, in stubborn obstinacy, but in the rigorous suspension of judgment, in the careful and exhaustive search for data, in critical analyses of these data, and in the insistence upon reasonable verification. Thorndike believes that independence is not unreadiness to obey, but the tendency to contribute more than is called for; not refusal to believe, but the tendency to examine carefully the basis of the opinion. Initiative is not unwillingness to coöperate, but the readiness and ability to speed up, or to go ahead

working along lines of intelligently determined thought and action.[8]

The lessons involving reflective thought seem to afford some of the best opportunities for training these desirable traits. The elements in the thought process can be made clear. It can be shown that authorities are entitled to respect because of the exhaustive verifiable evidence upon which their conclusions rest. The learner can be taught to choose his authorities on the basis of impartial, verifiable, objective, and precise evidence, and that he may differ with these experts only on the basis of a critical examination of their data and inferences. New evidence, an error in the old evidence, or a fallacy in the reasoning process must be found before intelligent difference of opinion can arise. Differences of opinion or expression of opinion based upon hopes, fears, desires, emotions, whims, prejudices, personal interests, superstitions, or what not, cannot be regarded as commendable expressions of independent thinking or of individuality, but rather as expressions of the direct opposite.

Individual difference in problem-solving ability. We have emphasized earlier that the pupil must do the thinking. We have also emphasized that individuals differ greatly in their ability to do anything. Each pupil must be given opportunity to work out problems, to think. Obviously, there must be much time allowed for trial and success, for gathering data, for inspecting problems, for consulting authorities, or using other forms of proof, particularly for the slower ones. Schools are not so organized, except under systems of individual instruction, that an ideal amount of time can be given for all learners to do this, but every opportunity possible must be obtained for the slow

[8] See E. L. Thorndike, "Education for Individuality and Originality," *Teachers College Record,* Vol. 17, pp. 405-416; "Intelligence and Its Uses," *Harper's Magazine,* January, 1920, pp. 227-235; and "The Psychology of the Half-Educated Man," *Harper's Magazine,* April, 1920, pp. 666-670.

thinkers to do some thinking, even if such opportunities are very few. They cannot learn otherwise. The fast thinker, the bright pupil, can learn much by following the teacher through a problem, or from organizing material found in texts and references. Group lessons with individual assignments are a good device to provide every one an opportunity to participate in proportion to his ability. In assigning and questioning, the teacher must distribute opportunities for thinking so that both types of pupils get all the opportunities that time will allow.

Supplementary Assignment

Because of the importance and value of this topic, it is suggested that students be required to study and discuss one of the following three references. Students may select any one as the material is sufficiently unified to permit class discussion, regardless of which book is consulted by different students.

1. Kilpatrick, W. H., *Foundations of Method* (Macmillan Co., 1925), Ch. xv. An excellent, distinctly clever presentation, particularly regarding the relation of the Herbartian formula to problem solving.
2. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. ix. Contains best modern discussion of problem solving as applied to high-school teaching.
3. ———, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923), Ch. x. Contains best modern presentation as applied to elementary teaching.

References for possible voluntary projects. Should individual students become interested enough in this field to wish to carry out their term papers in it, or to do further study of an individual sort, the following two references are suggested as starting points.

1. Boraas, Julius, *Teaching to Think* (Macmillan Co., 1924). An unusual and remarkable book. Concrete and extremely interesting treatment.
2. Dewey, John, *How We Think* (D. C. Heath & Co., 1910). Probably the best discussion of thinking ever written. Parts of it difficult reading. Supplies background for most of the modern writing on pedagogy.

Discussion Questions for Summarizing and Testing on Problem 4

1. Identify in a sentence or two the phase of problem solving hinted at in each of the pre-test questions. Locate the pages in the text covering each.

2. Duplicate with a more complex illustration from adult life the learning procedure utilized by the boy in learning the definition of a cowboy.

3. Read the reference in Dewey, pages 82-83, referred to in the introduction to this problem. State clearly how his use of the terms induction and deduction differs from that of the ordinary writer.

4. Turn to the quotation from Dewey concerning the nature of thought, as reproduced in the foregoing pages, and select one sentence from which you might organize a lecture on the nature of thinking. That is, the one sentence which seems to you to embody the most.

5. Turn to the quotation describing Kepler's thinking. Go through it and select all the statements therein that are *general*, that is, that might refer to the thinking of any one; select all that refer only to Kepler's *individual* peculiarities.

6. An engineer is called upon to determine the nature of a bridge necessary to span a deep canyon. A sociologist is trying to determine the influence of the negroes of Birmingham on Southern culture. Summarize in organized manner the likenesses and differences in these two problems.

7. Recall the individual, who when asked for her problems, said she had none.

a. What is the matter with her thinking?
b. What might be done to bring her to a realization of the situation?

8. Are inventors merely lucky individuals, do they "hit on the answer"? As a matter of fact, how are most inventions brought about? Relate the process clearly to the problem-solving process as outlined above. What is the guidance for teaching?

9. At almost any trial, scores of prospective jurors are excused because they have formed opinions on the case.

a. Analyze this situation fully in the light of what you know about thinking.
b. What task is here implied for the school?

10. Should laboratory manuals be very explicit, or not at all explicit?

a. List the advantages and disadvantages of each type.
b. Which do you prefer and why?

11. The case is cited in which an eighth-grade class were making illustrations for the story of Rip Van Winkle. Several objections were raised to one picture showing Rip mending a fence.

a. Analyze the thinking of the objecting students in terms of what you know about thinking.

12. When should problems (such as our pre-test questions) precede the text? When should the text be attacked first?

13. Under what circumstances should the teacher let a student proceed with an hypothesis which she knows is wrong? When prevent him going ahead?

Written Exercise

If desired, the students can be asked to write out a word picture of a thought process, to describe in detail the *process* of thinking.

General directions to the student. Select any one of the following and work out an answer. Think it out, ask others, get group discussion if you can. The *answer* to the question is not so important as the *process* of securing it. Keep a record and analyze the process in terms of the foregoing discussion of problem serving. Do not quibble over words, the general meaning and setting of the problems are clear.

After writing this analysis, make a brief but adequate summary of inferences regarding teaching. In other words, specifically what guidance for teaching can you derive from this exercise?

1. *Situation.* The twenty-one-year-old son of a millionaire, a college graduate, is wrecked on a remote island, peopled by a primitive race. This man has always lived in a large city, his money has procured him anything he needed or wanted. He has never done a day's work, though not lazy, and has always been much interested in the type of life he led.

There is no chance for rescue for years, if at all. He must either work, play, and live as the natives do, or die. He takes up their existence, comes to like the active outdoor existence, marries a native.

Ten years pass. A ship loses its way and finds the remote island. The man can be taken back to civilization and take up his old life.

Question. Will he return or stay?

2. *Situation.* A book is published anonymously and becomes famous. A disappointed man, a failure in life, tells his wife in order to regain her respect and love that he is the unknown author of the book. The true author hears of this statement, makes the acquaintance of the faker, in due time revealing who he is. The false author commits suicide. Meanwhile, the real author has fallen in love with the wife, now the widow of the dead man. She believes passionately in the integrity and ability of her dead husband and will not remarry.

Question. Will the author tell her the truth, or will he allow her to go on believing her husband the author of the book, arranging that part of the royalties go to her to keep up the deception?

3. *Situation.* A housewife is faced with the choice of giving her family a sketchy, inadequate dinner in order to get away to a very important business engagement, or giving them a good meal and being late to the engagement.

Question. Which will she do?

4. *Situation.* A teacher has two invitations for the summer vacation: To spend the time with wealthy relatives whom she very seldom gets to see, or to go on a trip to places of historical interest which she has never seen.

Question. Which vacation will she choose?

5. A certain poet has said that human beings would be happier if they occasionally spent some of their money for the narcissus in life, even if occasionally they had to dip into the bread allowance to do it.

Question. What do you think about it?

Remember: In all these questions the answer is of little importance. How did you get the answer? Do you recognize the gathering of data, bold guessing as to probable answers, evaluation, and criticism of these hypotheses, summarizing arguments, finally deciding upon a tentative answer which seems to you to be justifiable?

Observation Exercise for Problem 4

Teacher Activity

Setting the Problem

1. Does the teacher "set the stage":

a. By calling up related ideas, or by supplying necessary background for interpreting the new?
b. By arousing the proper mental attitudes, either through use of the pupils' instinctive interests, or by means of the intrinsic worth of the subject matter?
c. By the statement of a clear-cut, concise aim, indicating the line of activity, mental or motor, for the period?

2. Does the teacher set the aim, or make it grow out of a situation developed by her so that the pupils feel the problem to be theirs?

3. Does she check to see that all have and understand the aim?

Inspection

1. Does the teacher show skill in directing analyses of the problems, in suggesting leads; in shifting from point to point?

2. Does she suggest sources of information, and stimulate the pupils to find others?

3. Does she skillfully stimulate the class to suggest hypotheses; to criticize and evaluate them; to rule out the irrelevant ones?

4. Does she guide pupils in evaluating statements found; in discriminating betweeen conflicting arguments? Does she manifest suspended judgment?

5. Does she encourage the class to insist on reasonable verification; to verify statements when possible?

6. Does she make skillful and economical use of summaries, briefs, outlines, maps, charts, graphs, etc., to organize and systematize the data discovered? Does she stay on the topic?

7. If the problem is not finished within the period, is there definite provision for reopening the discussion or for outside work?

Inference

1. Does the teacher refrain from doing this herself? Is she patient in encouraging the pupils to make better their first crude and unfinished inferences?

2. Is she alert to note those inferences which are correct but crudely stated; those which are logically correct but do not bear on the problem; those which are mere guesses?

3. Does she exhibit skill in having the class prove or disprove its own inferences? Does she refrain from dogmatically accepting or rejecting them?

4. Does she continue through the lesson the systematizing and organizing of the material?

Verification

[Possible methods are: appeal to the authority of book, teacher, or outside expert; further reading; other like cases to work on; weight of opinion; experiment, etc.]

1. Does the teacher insist upon reasonable verification for the various inferences as they appear?

2. Does she appear to utilize the best method applicable under the particular circumstances?

3. Does she skillfully lead the pupils to handle conflicting evidence while verifying?

Pupil Activity

Setting the Problem: Purposing

1. Do the pupils see and suggest problems for solution? Do they ask questions leading to good aims?

2. Do they freely inject their own interests into school problems?

3. Do they participate in defining and clarifying the problems by asking questions when they do not understand? By relating personal experiences; by restating previous class discussions, etc.?

4. Do they manifest an alert and attentive attitude, or are they passive and inattentive?

5. Do they start making suggestions as to solutions, sources, methods of attack, etc., as soon as the problem is clear?

6. Do they restate the aim, or indicate clear understanding of what is to be done?

Inspection

1. Do the pupils participate actively and aggressively in planning the attack upon the problem? Do they suggest ways to proceed? Sources of information?

2. Do they participate in breaking the big problem into smaller ones? Do they suggest subaims and group assignments? Do they assist in organizing the smaller groups and in distributing the smaller assignments? Do these groups work in an independent but orderly manner?

3. Do pupils respond actively to the situation by relating personal experiences, by gathering and stating information from books, magazines, encyclopedias, other people, etc.?

4. Do they see the relation of the problem to previous exercises of a like nature and attempt to restate and use the procedure of the earlier case?

5. Do they volunteer freely to make reports, to bring in illustrative material, to find a special source or piece of information?

6. Do they avoid too quick acceptance or rejection of suggestions, statements, possibilities, etc.? Do they give evidence for their statements? Demand it from classmates?

7. Do they manifest a readiness to accept good clear evidence, avoid sulking when their ideas are rejected? Avoid stubborn insistence on statements that have been rejected for cause by class? If they insist on statements, do they search for more information to uphold their contention? Try to prove it logically with other instances?

8. Do they try to make outlines of their own, to organize data into tables or graphs in order to avoid confusion, repetition, etc.? Do they change and reconstruct these as progress demands it?

9. Do they manifest growing ability to differentiate between principal and subsidiary facts in making their outlines, graphs, tables, maps, etc.?

10. Do they insist upon clear-cut, definite statements? Ask each other to tell more exactly what they mean? Do they offer constructive criticisms, suggestions, corroborations, etc.?

11. Do they indicate understanding of the purpose of this phase of the lesson by starting to draw generalizations or make inferences when sufficient data have been assembled?

Inference

1. Do the pupils manifest the natural tendency to make inferences as soon as any data have been presented?

2. Do they attempt to better these first inferences by search-

ing for more information? By rewording? By offering constructive criticisms to each other?

3. Do they manifest caution without timidity in proposing inferences? In accepting or rejecting the statements of others?

4. Do they give evidence for their own inferences, avoiding guessing? Can they answer the question "Why?" after advancing a statement?

5. Do they demand evidence from their classmates?

6. Do they accept good clear evidence? Refrain from sulking or stubborn insistence when their ideas are rejected by the group? Do they ever, in refusing to give up an idea, attempt to uphold it by searching for more data or new sources?

Verification

1. Do pupils in stating inferences include their evidence as partial verification? Do they ask classmates such questions as, "How do you know?" "Where did you find that?" "How do you know that the person who told you or the book you read is right?"

2. Do they cite instances in contradiction or seeming contradiction of inferences suggested?

3. Do they try actively to bring into agreement statements from sources that differ materially, or those which flatly contradict each other? Do they reinspect their statements? Do they avoid choosing one view to the exclusion of the other for trivial reasons or no reason at all? Do some seem quite helpless in the face of contradictory evidence?

4. Do they manifest a growing ability to distinguish between authorities which are reliable and those which are not? Do they state possible sources of bias—politics, religion, race, personal interest, etc.? Show the absence of such bias in others?

General Questions

1. Do the pupils pass the standard reasoning tests in the various subjects for their age and grade?

2. Do they manifest a growing ability to express themselves clearly and coherently in their own words? To avoid such expressions as, "I know but can't tell exactly"?

3. Do they bring to class questions, illustrations, etc., which indicate outside thinking on classroom problems? Do they util-

ize class thinking on the playground? In other outside situations?

4. Do they manifest a growing ability to examine specific cases and form intelligent generalizations? To examine and analyze data upon which to base inferences? Can they verify easily and rapidly? Do they do this both in class situations and in outside activities?

Parallel Readings for Problem 4

[NOTE: References made earlier under supplementary and individual assignments to Boraas, Dewey, Kilpatrick, and Parker.]

1. CHARTERS, W. W., *Methods of Teaching* (Row, Peterson & Co., revised, 1912). Follows Dewey but not so clearly as some other authors. Contains criticism of lesson steps as outlined in this and following problem. Chs. ii, xiii, xix, xx.
2. EARHART, Lyda B., *Types of Teaching* (Houghton Mifflin & Co., 1915), Chs. v, vi.
3. FOSTER, H. H., *Principles of Teaching in Secondary Education* (Charles Scribner's Sons, 1921), Ch. viii. Excellent, well organized.
4. FREELAND, George E., *Modern Elementary School Practice* (Macmillan Co., 1919). Good concrete discussion of problem-solving assignments, pp. 6-44.
5. FREEMAN, F. N., *How Children Think* (Houghton Mifflin & Co., 1917), Ch. xi.
6. GRANT, J. R., *Acquiring Skill in Teaching* (Silver, Burdett & Co., 1922). Whole book is good illustration of motivating problem solving.
7. KILPATRICK, W. H., *Foundations of Method* (Macmillan Co., 1925). Ch. xv contains an excellent and distinctly clever presentation, particularly regarding the relation of the Herbartian formula to problem solving.
8. LYMAN, R. L., *The Mind at Work* (Scott, Foresman & Co., 1924). An excellent analytical discussion of all phases.
9. MCMURRY, F. M., and C. A., *The Method of the Recitation* (Macmillan Co., 1903). An early discussion which is better than many more recent presentations.
10. MILLER, I. E., *The Psychology of Thinking* (Macmillan Co., 1909). Some parts are difficult reading. One of best treatments of inductive and deductive treatment, following Dewey rather strictly.
11. MONROE, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927). Ch. viii contains somewhat badly organized discussion; but valuable to advanced students.

12. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised 1920). Ch. ix contains excellent modern discussion.
13. ———, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923). Ch. x contains discussion similar to preceding reference but with emphasis on elementary school.
14. Strayer, G. D., *Brief Course in the Teaching Process* (Macmillan Co., 1911). Chs. v, vi, contain brief, somewhat formal discussion.
15. Thorndike, E. L., *Principles of Teaching* (A. G. Seiler, 1906). Chs. ix, x, contain an influential discussion. Excellent problems for class use.
16. ———, "Education for Individuality and Originality," *Teachers College Record,* November, 1916, Vol. 17, pp. 405-416. Forceful discussion of the proper exercise of individuality in thinking.
17. ———, "Intelligence and Its Uses," *Harper's Magazine,* January, 1920, pp. 227-235. Good discussion of independent thinking.
18. ———, "The Psychology of the Half-Educated Man," *Harper's Magazine,* April, 1920, pp. 666-670. Forceful and pungent discussion of the absurdity of much everyday thinking. Interesting style.
19. Waples, Douglas, *Procedures in High-School Teaching* (Macmillan Co., 1924). Chs. xiii, xiv, are excellent. Whole book illustrates problem-solving procedure.
20. Wilson, H. B., Kyte, G. C., and Lull, H. G., *Modern Methods of Teaching* (Silver, Burdett & Co., 1924), Ch. vii. Good concrete discussion.

PROBLEM 4A

IS THERE ANY VALUE IN HERBARTIAN FORMAL STEPS?

Exploratory and Pre-Test Questions

None. Proceed to study of the text.

As stated earlier this formula, the "five formal steps," was the first important effort to (1) organize teaching in accord with learning, and (2) to aim at coherent organized knowledge in place of fragmentary factual information. At first, it was looked upon as a universal formula for use in all teaching. It is now realized that there are several other general procedures in teaching.

It was from the beginning a teacher-dominated affair. The "pupil's" aim was stated generally by the teacher. In the hands of individuals of good training and some native ability for thinking, the formula often resulted in high-grade teaching. In the hands of poor and mediocre teachers, it was a two-edged sword. Such teachers must have a formula or organization, or their work is unorganized and poor. But in the hands of such teachers, the very formula which they must have degenerates into rigid formalism. This fact, together with the growing emphasis on the pupil-centered procedure brought the five formal steps into considerable disrepute. It was fashionable to criticize them and to decry their use. It was also thought that they did not approximate the process of thought. In his 1915 edition of *General Methods of Teaching in High Schools*, Parker [1] inserted a special footnote saying that the formula was merely a device to aid in lesson planning and

[1] S. C. Parker, *Methods of Teaching in High Schools* (Ginn & Co., 1915), p. 229.

was not of value in directing thought. Further study, however, induced him to reverse this, and in the 1920 revised edition the footnote states that the formula does coincide roughly with the process of thought.

The steps do approximate the process of thought, as Parker discovered, particularly that phase of thought known as inductive. While far less use can be made of so-called inductive lessons, there is yet a considerable amount of material which is best taught by means of a modernized, or as some one has said, a "Deweyized" five formal steps. That is, with pupil purpose, interest, and motive uppermost, displacing rigid teacher domination, the learning process does go on by means of examining and comparing specific cases, drawing therefrom general notions, rules, and definitions. The first part of the story about the boy and the cowboys illustrates the matter accurately. He met, examined, and compared a number of specific examples, and constructed a general definition which he later applied to a new case. Thus the five formal steps,—preparation, presentation, comparison, generalization, application. We are here concerned with the first four only. As has been noted many times, lesson steps are not rigidly fixed, but must be varied as circumstances demand. Much of the criticism of them has arisen from improper handling by teachers who were not well acquainted with the psychology back of them. Sometimes one step is so short as to be hardly noticeable, or again one step may occupy several days. The whole process may be finished in a few minutes in some lessons, but take days in another.

In a still later discussion than the two noted above, Parker [2] says:

> To be sure these [steps] do not apply in introducing pupils to every arithmetical process. For example, the kindergarten and

[2] S. C. Parker, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923), pp. 155 *ff*, 430, 452.

first-grade children who are learning to count do not formulate or follow any definite rules in their arithmetical thinking. Moreover, even when a rule is adopted, a teacher will frequently be justified in stating it for the pupils without waiting for them to formulate it. However, the teacher who is keenly interested in making good arithmetical thinkers of her pupils, will frequently observe all the above steps. . . .

In introducing pupils to each correct form (in letter writing) and giving them practice in using it, some adaptation of the Herbartian formal steps is probably desirable. . . .

To summarize in three rules the fundamental characteristics of such skilled teaching of (arithmetical processes, letter-writing forms, grammatical rules) . . . we may repeat here the statement that the most essential features of this Herbartian procedure are as follows:

1. *Experiencing clear-cut examples.* Give the pupils personal experiences with clear-cut, varied, typical examples of the form, process, or rule.

2. *Attentive scrutiny.* Raise questions which stimulate the pupils to scrutinize attentively these examples so as to note the general characteristics of the latter.

3. *Varied applications.* Give varied exercises that will train the pupils in recognizing the form, process, or rule, and applying it in new situations.

What are the principal things a teacher should do under the different steps? What should the learners be doing? What things should both teachers and learners avoid under the different steps?

Preparation. As the name indicates, this step prepares the learner for the work to come. If the name *purposing* makes it easier to remember that emphasis must be on the pupil's motives and interests, the newer term may be used. In any event three things must be accomplished, interest aroused, old knowledge recalled, and an aim, question, or problem set up. In the terminology of Thorndike and Kilpatrick, the pupil must be in a state of readiness. These items have been discussed at length in earlier pages, and the points will not be repeated here.

Presentation. In this step the new material is presented to the class. This statement must not lead any one to suppose that the material is given to the pupil without effort on his part. As stated in the discussion of self-activity, the learning process is an active one and the pupil must always participate. The teacher skillfully sets the conditions, but the pupil must acquire the new material through his own efforts.

It is not often in real life that a series of examples will be placed before the learner rapidly and consecutively as in the case of the lad and the cowboys. Months, or even years, might elapse before certain rules, generalizations, or abstract meanings were learned by experience. The school must present rapidly and effectively a number of specific examples so that the generalization may be arrived at quickly and correctly. Many teachers blunder here in presenting a large number of specifics that are practically alike. The best procedure is rather to present one, or at most two or three, broadly typical illustrations, and then only such others as make clear the few points not emphasized in the first ones. Too many examples usually confuse the mind. One occupies the focus of attention, and the mind makes excursions to others to note likeness or difference. Sometimes an illustration of the direct opposite will serve to make clear what is being taught. Any device of this nature is preferable to the mere multiplication of illustrations. Care should be taken to secure *sufficient, varied, typical* examples.

The well-known *type method* is based largely on the psychological principles just explained. In place of taking the time in school to discuss a great many cities, river systems, geographical regions, transportation systems, etc., one example of each case is taken and studied in such detail that the normal individual can at once apply the general notion learned to any new situation. The type

method is not a separate method, as some teachers apparently think, but an illustration of the type discussed here, namely, the learning of abstract meanings or, in the older terminology, an inductive lesson.

How then shall these new experiences be placed before the class for attack? A most important source of material, and one of the best for thorough understanding is the past experience of the pupils. They have a great number of experiences that have not hitherto been organized into abstractions and generalizations. The latter constitute the new knowledge, and the recounting and reorganizing of old knowledge is probably the best basis for them.

Failing such a store of experience, the school must approximate the real-life situation as closely as possible in giving the new material. Experimental work in the laboratory was an effort to meet this requirement, and poor as such work has been, the laboratory still presents a great opportunity to the teacher in presenting new material. Pupils should perform the operations as a rule, but demonstrations must often be made by the teacher where expensive materials or complicated processes are used.

The excursion to mill, factory, farm, store, forest, lake, or beach is another device for presenting new material that, like the laboratory, is badly misused. An unorganized excursion not only fails to give the pupil the material to be learned but has a detrimental effect upon routine and good order. Excursions should be used far more than they are, but should be definitely planned to the last detail. The teacher should go over the ground beforehand and make sure that everything is ready. Signals and movements should be definitely explained to the children. Individual assignments to different children, in addition to the general assignment for all, will help in maintaining attention and order. There is more need for careful and exact assigning for an excursion than for a textbook lesson.

When well organized, the excursion is an exceptionally good teaching device, and much learning results, but the teacher who is weak in organization and routine should not attempt it.

Probably the most common way of presenting new material will be to have the pupil read in his textbook or in references. This may be supplemented by the use of pictures, stories, real objects, graphs and curves, or demonstrations. The lecture method should be used very rarely, if at all, in the grades. Writing sentences or examples on the blackboard, or throwing illustrations upon a motion-picture screen are still other methods. The points made in preceding paragraphs regarding presentation apply to these latter methods as well. Even greater care is necessary to make the illustrations sufficient, typical, and varied because these methods are further from the real experience than are some of those discussed first.

When the presentation step extends over any great length of time, and when the pupils are engaged in somewhat complicated analysis, they should be trained to stop and take stock occasionally. The aim should be recalled and the work summarized in an effort to see how much has been done to solve the problem, and how much remains to be done; not only the amount but the method of work should be scrutinized. This scrutiny will aid in keeping the class on the main problem and will aid in preventing much digression.

To summarize the presentation step: The pupil should actively attack and analyze a number of varied and typical illustrations of the generalization to be learned. The teacher may present these for his attack in any of several ways, seeking always to come as near to real experiences on the part of the pupil as the nature of the material will permit. Outlines and summaries should be made from time to time in order to determine progress.

Comparison. An attempt to discuss what goes on during the process of comparison brings out clearly the point already frequently referred to, that the steps in lesson procedures are not fixed and rigid. The teacher who regards them as rigid is on the road to failure. It is correct to say that comparison begins during the presentation step and continues on into the generalization. Rigidly and artificially, we may think of the pupil as having the specific examples before him, discussing them fully, and then comparing to find the likenesses with which to make the general statement. But as a matter of fact, the mind begins to generalize immediately, on presentation of the first example. The common fault of "jumping at conclusions" is just this normal activity of the mind arriving at a conclusion without sufficient examination and comparison of data. In lists of sentences illustrating the parts of speech, in lists of spelling words presenting the same difficulty, or in lists of problems for teaching simple arithmetical processes, the similarity leading to the definition or rule can be made to stand out very clearly. It is quickly grasped and there is little comparison as such.

However, in the content subjects each specific illustration might take several days to present, or might even come in different parts of the course. Should that happen, they must be called up together after each has been presented and a careful comparison made to determine the underlying likeness. Here is involved a difficult thought process, and one that distinguishes the real thinker from the individual who is always wondering what it is all about. Data had been before the human race for untold ages before they were compared and generalized into the Darwinian Theory. The same may be said of the Copernican Theory. The specific examples were not alike in externals, they were scattered all over the world or out in space, but the great mind called them up together for comparison. A good

example of this type of comparison is cited by Miss Earhart: [3]

> Thus the pupils in history who were studying the French Revolution, found during the step of presentation that the French people had objected to long-continued tyranny, and had set up a new government in which the rights of the people were to have more recognition than under the old form. In the step of comparison, they found that the English under Charles I had done the same; that the Americans under George III, and the Cubans under Spanish control, had worked for and attained similar results. They discovered tyranny on the part of all governments, various attempts to overcome it on the part of the people in each nation; and, as it happened in each of these cases, they found that the oppressive power was finally overthrown after protracted struggle.

Another example, taken from American history, could be made in a series of lessons teaching the section of the Constitution that relates to treason. The cases of Benedict Arnold, Aaron Burr, and Charles Lee could be recalled and examined in detail. They would be found to be alike in fundamentals, and references to the Constitution would show that the definition of treason and the provision for punishment embodies these fundamentals. In cases of comparison such as those cited here, there is need for organization and summary as in the presentation step; otherwise discussion will wander.

The chief duty of the teacher is to refrain from doing the work herself. If she makes the comparison, the learner is robbed of the opportunity to do the thinking involved. There is no need to present data carefully and elaborately unless the learner is going to exercise his mind upon them. Great skill is often required to direct the pupils to the essential points without telling or "giving it away." Contrasts are sometimes effective here as in the preceding step.

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[3] L. B. Earhart, *Types of Teaching* (Houghton Mifflin Co., 1915), p. 47.

Time, of course, is the big element in determining how elaborately the teacher may allow the pupil to follow his own route to the essentials. This leads directly to a consideration of the next step.

Generalization. The pupil should formulate the result of his observation and comparison into a statement that will be a definition, rule, or some form of generalization. This process has been going on ever since the first observation took place. Small children illustrate this continuous process of generalizing very well in learning about common objects. The first definition of a mother, a dog, a cat, a table, is in terms of the first example, and many children are tenacious of the first specific idea, being slow to admit other specifics as cases in point. This tendency to retain the specific in the generalization persists some little time in the grades, as shown by the child who stated that "Gravitation is when an apple falls off the tree." A higher stage is reached when pupils themselves begin to introduce general terms.

The utmost skill must be exercised by the teacher in aiding pupils to state and restate their findings until the definition is worked over into satisfactory terms. Many irrelevant and unwarranted suggestions will be made which should be rejected in an orderly and systematic way. The pupil should be led to correct his own mistakes, if possible, before the teacher resorts to dogmatic rejection. By suggesting implications or throwing in a new fact or two, the teacher can train suspension of judgment. The class must be made to realize that judgment should wait until all data are in. There is always a great temptation to make the statement for the learner, or at least to speed it up. This must be scrupulously avoided unless the time element is really pressing. The crude results, the experimentation, the working over of the generalization are all vital parts of the learning process, and as pointed out above, they

must be done by the learner. Care should be taken, however, that their part of the lesson does not degenerate into mere guessing, and replace worth while trial-and-success learning.

The teacher should polish the statement and supply the technical wording only when the class indicates clearly that it has grasped the underlying idea. Teachers are often impatient with the so-called funny answers of children, and often blunder in refusing to consider the oddly worded statement. A class should not be expected to give the exact statement that is in the mind of the teacher. She must be flexible and quick enough in her thinking to realize that the proper idea is there even if the words are off. The boy who said that "the centaur is half infantry and half cavalry," made an odd but not an illogical statement. The foreign student who translated "The spirit is willing but the flesh is weak," into "The ghost is willing but the meat is feeble," had the idea if not the vocabulary. The statement that "Gravitation is that which if there were none we would all fall up in the air," indicates an understanding of the idea despite inability to phrase it correctly. These, of course, are extreme instances, but they serve to emphasize the fact that the teacher must not expect or insist on a correctly worded statement. In some cases of peculiar answers the teacher and not the child is at fault, as in the case of the boy who said that, "Lincoln had a woman make him some shirts from rails that he had split. They were hickory rails, hence hickory shirts." Probably insufficient or confused presentation had been made by the teacher, and the pupil confused meanings and ideas.

Application. This step usually consists of an assignment of drill material. It may, however, involve a problem-solving (deductive) lesson or a series of such lessons as extensive and rich as those involved in the original learning of the generalization now being proved.

Limitations of this method of teaching. Many teachers feel that the somewhat lengthy process here outlined for learning rules, processes, and definitions is a waste of time. Such an argument is based on a misunderstanding of the applications of the method. In many lessons the procedure is brief, though true to the thought process involved. It can be adapted to many lessons in the crowded program of the rural school. In many cases where it does take some time, it is justifiable because in the end time will be saved because better understanding results, plus gain in the use of the process itself. Telling may be shorter at the time, but there is no guarantee of retention or understanding. Frequently, time is actually wasted by the seemingly quicker lecture method.

However, the method should not be used in the case of abstractions or rules so simple as to be grasped immediately upon explanation. Also, the teacher should avoid teaching at length a generalization that is already known to the class. Some normal graduates from schools where this method is improperly exploited seem to have the idea that any piece of subject matter can be treated thus. Obviously this is absurd. Only those things that lead to laws, rules, definitions, principles, or generalizations of one sort or another are susceptible of such organization used in this method of teaching.

Much material is never carried further than the presentation step. The other illustrations and the abstract principle itself may be so remote as to be nonessential. The presentation of pictures, the telling of stories, the study of common objects are all examples of material that involve only preparation and presentation. In some subjects, of course, such as the lessons quoted above from Earhart, or with a group of stories, there will be a series of lessons involving the first two steps and then a comparison exercise later on.

Morrison's procedure for science units. Morrison's teaching cycle [4] for science units is a modern teaching outline related to the Herbartian formula. This also consists of five steps,—exploration, presentation, assimilation, organization, recitation. These steps are clearly defined by their author, and used throughout his discussion as defined.

Morrison's general outline of teaching procedure involves three phases: stimulus, assimilation, and reaction. In the science cycle, obviously exploration and presentation are stimuli, assimilation follows, organization and recitation are the reaction members.

Exploration serves to orient the teacher with reference to the status and needs of the class, and to orient the class with reference to what is to come. The pre-test may be oral or written, formal or conversational, depending on material and group. It may involve part of a class period or several periods. When the teacher has discovered the approximate limits of class knowledge, and when the learners are ready and eager to proceed, it is time for the next step.

Presentation as used by Morrison has a definite, limited meaning. The major essentials of the understanding that the unit implies and is to develop, are presented by the teacher in lecture or demonstration. There is no development by questions or attempt to teach the details. This step is still a part of orientation and stimulation.

By assimilation is meant a procedure approximately the same as that of our best present practices in supervised study or laboratory work. The class works individually or in groups under the skillful and sympathetic guidance of the teacher. Many diverse activities may take place as the learner proceeds toward complete understanding of the desired outcome, and toward fitting it into the complex of

[4] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Chs. xiv-xvii.

understandings and attitudes which constitutes his intellectual self. In this step individual differences are discovered and adjusted, problem cases are segregated for special teaching.

The pupil is then to organize a logical and convincing argument upholding and making explicit the understanding involved. He has now absorbed what he was to learn and is starting to demonstrate his mastery.

The last step, recitation, is again definitely limited by Morrison to mean presentation of one's organization to the group. One or two are selected to make "floor talks"—present orally their organization—the others submitting written reports. The class tests each pupil's recitation by questions and discussion. The student before the class must explain, justify, or defend his exposition or organization.

A warning must be inserted here. Superficial students everywhere are misinterpreting Morrison's five-step science-type procedure to cover any and all units, just as the Herbartian five formal steps were misinterpreted earlier. Morrison outlines other procedures for the various unit types which he distinguishes; appreciation, language arts, practical arts, pure practice. His science-type procedure is by far the best known and, as stated, is taken by some to be a universal formula. It is like the Herbartian or any other formula, a procedure to be adapted by the genius of the individual teacher to circumstances and needs of any given situation. It is obviously related to the older formula in that the objective in each is understanding—a concept, generalization, or belief. It differs in that it is fully influenced by and utilizes the best of the modern discoveries and theories in learning and teaching, pre-test, diagnostic and remedial procedures, follow-up work, rich and regular supervised study periods, adaptation to individual differences, etc.

Discussion Questions for Summarizing and Testing on Problem 4A

None. Students should be asked to read a number of lesson plans in the reference given below and select those which seem to approximate the five formal steps or some variation of them. Oral or written critical evaluations may be made.

1. Burton, W. H., *Supervision and the Improvement of Teaching* (D. Appleton & Co., 1922), pp. 443-502.
2. Charters, W. W., *Methods of Teaching* (Row, Peterson & Co., 1912). Plans scattered through book.
3. Earhart, Lyda B., *Types of Teaching* (Houghton Mifflin Co., 1915), pp. 220-263.
4. Foster, H. H., *Principles of Teaching in Secondary Education* (Charles Scribner's Sons, 1921), pp. 341-359.
5. Freeland, G. E., *Modern Elementary School Practice* (Macmillan Co., 1919). Scattered through book.
6. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), pp. 455-564.
7. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Chs. xiv-xvii.
8. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920). Scattered through book.
9. ———, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923). Scattered through book.
10. Strayer, G. D., *Brief Course in the Teaching Process* (Macmillan Co., 1911), pp. 167-223.

Observation Exercise on Problem 4A

General Questions

1. Is the subject matter used adapted to this type of treatment?

2. Is the rule, principle, or process being taught, worth teaching this way? Is it really new to the class?

3. Is the sum total of the teacher's efforts toward the independent intelligent formulation of generalizations by the learners?

Teacher Activity

Preparation

[See outline for "Setting the Problem" in the observation outline for problem-solving lessons, end of Problem 4.]

Presentation

[Possible methods of presenting the new are: developing pupil experiences; lecturing or telling; having pupils report from references; observe experiments; make excursions; study pictures or objects.]

1. Does the teacher utilize the method best suited to the subject matter? Does she administer it properly?

2. Does she use sufficient, typical, varied examples? Avoid the extremes of too many or too few? Does she utilize pupil experience here? Do her illustrations show clearly the element to be abstracted and generalized? Does she use contrasts effectively?

3. Does the teacher provide for active aggressive analysis by the pupils? Distribute opportunity to contribute in relation to ability?

4. Does she guide pupils in evaluating statements found? In criticizing their own suggestions? In discriminating between conflicting arguments? Does she herself manifest suspended judgment in dealing with pupils?

5. Does she stimulate the class to be systematic and orderly, to take stock occasionally? Does she stay on the topic herself?

6. Does she provide for continuation and reopening of the discussion when it must be carried over from period to period?

Comparison

1. Does the teacher refrain from doing this herself? Show skill in guiding pupils to proper comparisons without "giving it away"? Are contrasts introduced if necessary?

2. Does she realize quickly from pupils' statements when she has made insufficient presentation?

Generalization

1. Does the teacher show skill and patience in guiding pupils through a series of crude, poorly worded formulations toward the completed definition?

2. Does she wait patiently until the learners indicate clearly that they have grasped the underlying idea, before she supplies the technical name or wording?

3. Does she, on the other hand, avoid a standstill in the learn-

ing process while trying to stimulate the class to formulate the statement?

4. Does she differentiate wisely between lessons that require exact scientific definitions and those that do not?

Pupil Activity

Preparation

[See outline for "Setting the Problem: Purposing" in the observation outline for problem solving, end of Problem 4.]

Presentation

[See outline for "Inspection" in the observation outline for problem solving, end of Problem 4.]

Comparison

1. Do the pupils pick out the essentials in the different specifics? Avoid obvious but superficial characteristics?

2. Do they attack the analysis independently? While avoiding dependence on the teacher do they ask questions when they are quite unable to proceed?

3. Do they accept the contributions made by different members of the class when such statements further the discussion? Reject with evidence those which are based on superficial analysis or on nonessential features?

4. Do they clarify their own and their classmates' statements by means of contrasts? By other constructive suggestions, rewording, etc.?

Generalization

1. Do the pupils begin to work toward a general statement while comparing specifics? Tend to slip over into statements that will cover all cases? [That is, do they show the natural tendency to go on and generalize, or do they seem to feel that the lesson is over when they have analyzed and discussed the specifics?]

2. Do they keep to the topic—begin to generalize in such way as to answer the original problem, question, or aim?

3. Do they note that all characteristics are not included at first and keep restating in an effort to include all? Do they reword again and again in order to get a smoother statement?

4. Do they reëxamine the specifics and recompare from time to time? Ask questions if they cannot proceed further? Indicate that they think the generalizing is complete by confining their attempts to rewording rather than trying to add new elements?

5. Do they accept and fit in any technical terms supplied by teacher or book?

6. Do they indicate understanding of the new generalization by citing other cases it will cover, in addition to those used in learning? Can they use it, technical terms and all, in picking out new cases in drill lessons?

7. Do they attempt to cite illustrations it will not cover? Do they attack and analyze these seeming contradictions in order to clarify the generalities?

Parallel Readings for Problem 4A

[Use the list of references under "Discussion Questions."]

PROBLEM 4B

WHAT IS THE PROJECT METHOD?

Exploratory and Pre-Test Questions

None. Proceed to study of the text

Few topics in the field of method have precipitated as much discussion and writing as has the project. It is inevitable that in so vast a literature as has been developed there will be found considerable rubbish. A number of weird pedagogical and psychological arguments have been advanced in support of what was supposed to be project-teaching, while the projects themselves have been of every conceivable type and form. Many bulletins have been published purporting to report or outline projects when, as a matter of fact, they contained courses of study or lists of isolated lesson topics arranged in a sequence. Widespread confusion has reigned among teachers. There has been great excitement from a relatively simple cause. What are the facts in the matter? A brief historical résumé may assist in the acquisition of clear ideas.

The "new education." Beginning with Colonel Parker about 1883, later carried on by John Dewey from about 1900, there was much discussion of the "new education."[1] Among its slogans were, "self-expression," "initiative," "self-realization," "coöperation," etc. It was the beginning of modern teaching, that which centers on the pupil in place of the teacher, which emphasizes learning more than teaching. Pupils' abilities, individual differences, motives, and purposes were coming into their own. The pupil's aim was

[1] John Dewey, *The School and Society* (University of Chicago Press, 1900), p. 4.

becoming his in fact, and not the teacher's. A number of improvements resulted, and as the doctrines of this one-time "new" education were developed and elaborated through the years, profound changes have come about in methods of teaching. Three of the most important results have been the emphases placed upon *motivation, problem solving,* and the *project.*

Motivation. This topic has already been treated in detail in Problem 2, Unit II. It is a phase of the doctrine of interest. Either by appealing to inherent interests, or by convincing the learner of the value of the subject matter, the teacher motivates him to effort and to learning. Often the situation motivates. Very often the learner motivates himself, has his own desires, aims, drives. Modern writers emphasize more and more the importance of the latter type of motive, that of the pupil. Failing pupil-originated motive, there must be pupil-accepted motive. The pupil must, in any event, desire the end to be accomplished, wish it strongly enough to engage in whole-hearted purposeful activity in achieving it. Whole-hearted activity is strongly motivated activity.

Problem solving. This topic, too, has just been presented in detail. Again we have the emphasis of the "new" education on pupil problems, training pupils to exercise their abilities in this line. This contrasts with the older conception of information as the end, and listening or reading as the learning activity. The pupil is now to think, to plan, to suggest, to try solutions, to evaluate, to verify—to do his own thinking.

The project. The foregoing outcomes of the "new" education are clearly identifiable and understood by all in approximately the same terminology. But with the project there is confusion as to meaning and definition, argument over place and use, difference of opinion as to value. What is the project? Why all this confusion concerning it?

Again an historical summary may assist in clarifying thinking.

Origin and use of the term "project." *First use by Richards in 1900.* Monroe [2] quotes Stevenson as saying that Stimson first used the term *project* to designate a teaching procedure in 1908. However, the term is to be found nearly ten years earlier in articles written about 1900-1901 by C. R. Richards,[3] then head of the department of manual training at Teachers College, Columbia University. He used the term to indicate a practical problem in which the learner participated in planning and carrying on the work. Manual training was at first merely the making of various articles in imitation of models aided by demonstrations from the instructor. The emphasis was on the manual or physical side; tool skills, the construction of certain objects were the aims. There was no thinking or problem-solving provided nor allowed. The learner had no opportunity to plan what he would make, nor how to make it. He did not even have to think what tools or materials to use, the directions told him. Colonel Parker, Dewey, Richards, and others wrote and argued vigorously against this type of work, advocating pupil planning and pupil participation. Richards used the word *project* to refer to constructive activities of the new type, making things in which the pupil was given an opportunity to express himself, to plan, to do problem-solving thinking. Other fields besides manual training began to emphasize pupil thinking in construction activities, borrowing the term project.

Definition by the Massachusetts State Board in 1908. This board used the term *home project* to designate a pupil-

[2] W. S. Monroe, *Directing Learning in the High School* (Doubleday, Page & Co., 1927), p. 447. Also J. A. Stevenson, *The Project Method of Teaching* (Macmillan Co., 1921), p. 40.

[3] Various articles by C. R. Richards are to be found from 1900 on, in *Teachers College Record,* and in the *Manual Training Magazine.*

planned practical enterprise which was being carried on at home, as for example, raising an acre of corn, raising a litter of pigs, remodeling a barn, etc.[4] The term was incorporated into legislation with this meaning for purposes of crediting such work. Neither the procedure nor the term spread rapidly beyond the fields of their origin. In 1918, however, the term sprang into prominence from several sources and widespread attention focused upon it.

Use by the Federal Board for Vocational Education, September, 1918. This Board not only defined[5] the term as they were using it, but indicated that the term had been used for a long time outside the school to mean a carefully planned practical activity.

> For many years the term "project" has been used (among scientific workers of the Department of Agriculture) to designate carefully planned investigations in agricultural science covering a considerable period of time, frequently demanding several years for their completion. Such plans, including aims and methods, have been submitted by the agricultural experiment stations of the several states and approved by the Office of Experiment Stations in the States Relations Service of the United States Department of Agriculture.
>
> More recently the term "project" under practically the same conditions has been applied to the projects in demonstration work and extension teaching carried out under the Smith-Lever Act. The term carries with it the idea of a program of importance, of some duration, and an expectation of certain tangible and valuable results. . . . This plan . . . had been adopted in most of the states having constructive legislation on agriculture in the secondary schools . . . the United States Department of Agriculture had previously accepted the prevailing conception of the home project, issuing several publications on this basis.

In view of the next definition to be quoted, it is well to note that the foregoing quotation refers to the "prevailing

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[4] Federal Board for Vocational Education, "The Home Project as a Phase of Vocational Agricultural Education," Agricultural Series No. 3, *Bulletin* 21, 1918, pp. 7-8.

[5] *Ibid.*

conception" of the project. What was the prevailing conception during the first eighteen years the term was used? It was a practical activity in which tangible, objective results were to be secured, in which pupil activity was not confined to motor activity but involved thinking, planning, devising—in short, practical problem solving.

Kilpatrick's definition, October, 1918. With this definition we have a new note, a departure from usage up to this date. Casting around for a unifying concept in method, Kilpatrick [6] selected the unit of purposeful activity, emphasized in it the element of purpose or drive, and labeled it *project.*

> It is to this purposeful act with the emphasis on the word purpose that I myself apply the term "project." I did not invent the term, nor did I start it on its educational career. Indeed, I do not know how long it has been in use. I did, however, consciously appropriate the word to designate to myself and for my classes the typical unit of the worthy life described above.

This differs sharply from previous definitions, and from some which came later. At this point we are interested only in the historical development of the term, arguments contrasting the two types of definition will be summarized later. We may note briefly that this definition of a project as "whole-hearted purposeful activity" was widely disseminated and precipitated much discussion. The contrasting definitions produced, from this date on, considerable confusion in the thinking and practice of the rank and file.

Hosic's problem-project definition in November, 1918. An excellent discussion showing clearly the strong influence of both definitions is that of Hosic,[7] defining what he calls the *problem-project.* He rejects *problem* as it "suggests a

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[6] W. H. Kilpatrick, "The Project Method," *Teachers College Bulletin,* Tenth Series, No. 3, October 12, 1918, p. 4.

[7] J. F. Hosic, "An Outline of the Problem-Project Method," *The English Journal,* Vol. 7, November, 1918, pp. 599-603.

purely intellectual process"; rejects *project* because it is "ordinarily associated in educational discussions with shop practice." He advocates *problem-project* because it "emphasizes both thinking and doing and points to an objective result." So far, he is wholly in accord with the original definition of a project. He then says, "a project may be defined as a single complete unit of purposeful experience," indicating the influence of the second definition. As pointed out elsewhere, the two ideas can be used together if "purposeful" indicates motivated. Hosic's discussion of the organization and direction of projects, indicates clearly his emphasis on thinking, planning, and using the traditional terminology of problem solving. His whole presentation, too long to quote, is excellent and should be studied in its entirety.[8]

The National Society Yearbook for 1921. This publication [9] contained brief accounts of 285 illustrative samples. Reflecting the confusion between the two definitions there was no agreement on a basal concept. Some samples illustrated quite clearly opportunities for practical problem solving, others not. The latter were speculative, rather than practical problems, that is, solved by reasoning alone with no overt and objective outcome. They illustrated what has commonly been called problem solving in all schools. This but illustrates further the confusion resulting from the two definitions.

The Charters-Stevenson definition in 1921. These men defined [10] the project as (*a*) a problematic act, (*b*) carried

[8] It is to be noted that in a later discussion (Hosic and Chase, *Brief Guide to the Project Method,* World Book Co., 1925), Hosic espouses the Kilpatrick definition but without giving reasons for its acceptance or for the rejection of the others.

[9] National Society for the Study of Education, *Twentieth Yearbook,* Part I (Public School Publishing Co., 1921).

[10] J. A. Stevenson, *The Project Method of Teaching* (Macmillan Co., 1921).

to completion, (*c*) in a natural setting. There was at once some argument as to the meaning and value of "natural setting," but this is not the chief item of importance in the definition. The important thing to note is the complete accord with the earlier definition, namely, a practical undertaking of problematic nature, involving objective outcomes. Here begins the recovery from the confusion due to two definitions. Reviewing the matter, these men rejected the definition of a project as "whole-hearted purposeful activity." In fact, Charters [11] criticizes it satirically:

> By Kilpatrick's definition, any act which is "whole-heartedly purposeful" becomes a project. . . . In short, it is fair, I think, to say that upon this basis any school problem, example, topic, drill exercise, test, review, application, illustration, demonstration, or practicum, becomes a project as soon as it has been whole-heartedly motivated. Therefore, every school activity may be a project, providing the learner prosecutes it with a "dominant purpose."
>
> And as soon as we attempt to use this definition as a method of classifying activities, we are completely at sea. Is making a dress a project? This we cannot tell until we have watched the individual engaged in the operation. When we find that the activity is "whole-heartedly purposeful" it becomes a project by the definition but is not a project until that point is reached. The girl who has been sewing on an apron for the past six months in school, but who is not whole-heartedly interested in the activity, is not working on a project. But her companion who loves the work and joyfully sews on a similar apron, has a project.
>
> Moreover, an activity might, by this definition, be a project to-day and cease to be one to-morrow. Our girl who has spent six months on an apron may have selected it with great enthusiasm and worked on it with vigor for two months. Then her interest may have disappeared for one reason or another. So, for two months making the apron was a project and for the other four months it was not.
>
> The truth is that in this case no definition is adequate which seeks to classify subject matter upon the basis of interest alone.

[11] From W. W. Charters, *Curriculum Construction* (1923), Ch. xiv. By permission of The Macmillan Company, publishers.

Interest is *subjective,* dependent upon a series of factors other than the content of the subject matter itself; whereas to make an adequate classification the factors according to which the classifying is done must be *objective.*

Charters is here discussing the project as a mode of organizing learning material, rather than as a method of procedure, but his argument holds in either case.

In order that both sides are heard, we may turn to Kilpatrick's [12] reply to the above criticism:

Might some activity begin as a project, but the purpose die away and the activity so end as a mere task?

Yes, if the purpose dies and the teacher still requires the completion of what was begun, then it becomes a task.

This means that we cannot objectively apply the term "project" as a label—once a project always a project?

Yes.

Isn't this a drawback? Doesn't it vitiate your definition?

No, it does not vitiate the definition. Nor do I think it a serious drawback. If I were more concerned with objective labeling than anything else, I might be troubled. But it so happens that I am more concerned with the learning of my pupils than I am with what you call objective labeling. I wish then a term that points to what I conceive to be the essence of the learner's attitude. When the purpose has gone, the learning process has much deteriorated. The excellence of the purpose definition is that it calls attention to this essential attitude on the part of the learner.

Parker's definition in 1922. This writer [13] defines the central element in project teaching as "the planning by the pupils of some practical activity, something to be done." He specifically locates the project as a subdivision under problem solving. In the project, the problem is *practical* as differentiated from *theoretical* or *speculative.* This is in

[12] From W. H. Kilpatrick, *Foundations of Method* (1925), pp. 348, 349. By permission of The Macmillan Company, publishers.

[13] S. C. Parker, *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1922), Ch. xii.

accord with the early usage and is in fact based upon an examination of the history of the method and term.

Use of the term in various secondary sources. The various writers of texts on method must use the term project and it is of interest to note their reaction to the two definitions. Foster[14] says:

> Another phase of the same movement (problem solving) is what is known as the project method. . . . The term project is used variously by different writers, even though the basal principle is clear enough.

Wilson, Kyte, and Lull[15] seem to have amalgamated both definitions happily, using each concept where it belongs:

> Some consider the project as an all inclusive concept for any acceptable teaching practice; others have retained its original meaning. . . . In this text the project method means a purposeful act requiring the completion of an objective piece of work. . . . The project is a rationalized concrete production of an end sought—involving the overcoming of an obstacle, perplexity, or other difficulty. It emphasizes child activity in motivated situations. . . . The steps in the execution of a project are almost identical with those for the solution of the problem.

Another view that seems to utilize the good in both definitions is that of Bagley and Keith:[16]

> An important and far-reaching result of the emphasis of the problem in teaching and learning has been the development of the "project method." . . . Means, in essence, to teach through the medium of problems for which he (learner) earnestly desires a solution. Lest the term "problem" be interpreted too narrowly

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[14] H. H. Foster, *Principles of Teaching in Secondary Education* (Charles Scribner's Sons, 1921), p. 149.

[15] Wilson, Kyte, and Lull, *Modern Methods of Teaching* (Silver, Burdett & Co., 1924), Ch. viii.

[16] From Bagley and Keith, *An Introduction to Teaching* (1924), pp. 237-238. By permission of The Macmillan Company, publishers.

. . . some prefer the term "purpose" and refer to the essential characteristic as "purposeful activity." Others . . . emphasize "natural setting." . . . From either point of view the important feature of project teaching lies in the attempt to make skill and knowledge dynamic. . . . The materials of education are taught . . . in the solution to real problems or through realization of whole-hearted purpose.

Another discussion attempting to resolve the confusion but which seems merely to reflect the confusion is that of Monroe.[17] The following quotations indicate the points of difficulty but there is no critical conclusion:

A variety of definitions have been proposed for "project" . . . but the one formulated by Kilpatrick appears to offer the most helpful description . . . "any unit of purposeful experience." A different definition by Stevenson defines a project as "a problematic act carried to completion in its natural setting." . . . Not necessarily incompatible with that of Kilpatrick. . . . Phases of the project method are to be found in many discussions of teaching, especially those dealing explicitly with motivation. . . . There appears to be confusion between the project method . . . and the problem method. A problem has many characteristics in common with a project. Both are occasions for reflective thinking; usually they represent relatively large units, sometimes their completion extending over several days or even weeks. . . . The significant difference is that the problem is assigned or at least created by the teacher; a project is originated by the students.

The above refers to the three factors in the muddle, problem, project, and motivation, but there is no critical evaluation. The last statement regarding the teacher-assigned nature of a problem is not justified by any existing analysis of problem solving, nor by the usage of competent teachers.

Charters[18] points out:

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[17] W. S. Monroe, *Directing Learning in the High School* (Doubleday, Page & Co., 1927), p. 448.

[18] From W. W. Charters, *Curriculum Construction* (1923), Ch. xiv. By permission of The Macmillan Company, publishers.

It happens curiously enough, that those who claim to be satisfied with the limited definition based on "whole-hearted interest," and to follow it, when they come to actual projects tend to select activities which are all characterized by still another element: the problematic—they involve relatively complicated and extensive thinking. This is all unconsciously a nearer approach to an adequate definition, because the project is, in addition to being "whole-heartedly purposeful" undoubtedly of the problem variety. The student starts with a purpose whose realization is reached by thought and planning rather than by mere habit.

It is not strictly correct to say that all who espouse the "whole-hearted purpose" definition tend to select problematic procedures as illustrations, since Kilpatrick's original classification included æsthetic or enjoyment projects. However, the statement is in the main correct and indicates, as Charters points out, "an unconscious approach to a more adequate definition."

Confusion among teachers due to two definitions. Few questions are asked supervisors or training school teachers more often than, "Just what is a project?" Again and again one hears, "There seem to be as many definitions for project as there are projects." There has unquestionably been tremendous confusion and difficulty among teachers in general. The foregoing historical summary makes clear one important reason for this confusion. There are two different conceptions of the project abroad, each with its protagonists. One states that the project is a problem-solving exercise of a practical nature. The other holds the project to be any whole-hearted purposeful activity. Each definition will provide a coherent organization if taken by itself. Unaware of the two concepts, lacking time to study critically the implications of either, the average teacher has come almost to doubt if any one really knows what a project is!

Is one definition better than the other? We may examine the rival definitions in the light of three criteria,

(1) historical origin and usage, (2) the etymology of the terms used, (3) the logical analysis of the concepts involved.

Historical usage. The term *project* was first used to designate a practical problematic exercise in which the pupil participated actively in selecting, planning, etc. This definition was used for eighteen years without question or qualification before the second definition appeared. In the ten years since the pronouncement of the second definition, a majority of writers have favored the original definition. This is a weighty but not conclusive argument.

Etymology of the word "project." A project is defined as "something of a practical nature thrown out for consideration of its being done," "a scheme, design, something intended or devised, a contrivance." The verb, to project, is defined as "to contrive, devise, to plan, as to project an expedition." This very clearly coincides with the original use of the word project as applied to school work. The use in the world is identical; a project is a practical problematic undertaking. We hear of the "St. Lawrence-Great Lakes Deep Waterways *Project,*" the "Columbia River Basin Irrigation *Project,*" the "General Motors Construction *Project.*" There is no support in the meaning of the word project for the idea that "whole-hearted purpose" is the *fundamentum.* Unquestionably all learning should be whole-hearted and purposeful, but that does not make it project learning.

The concepts involved. A clue to the difficulty here may be found in the following quotation from Parker: [19]

Avoid confusing project teaching with motivation. The description which we have given of *project teaching* (practical problem solving) will help the reader to avoid confusing the term with the educational concept of *motivation.* The central idea in the

[19] S. C. Parker, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923), p. 270.

recent discussions of *motivation* seems to be that a pupil secures valuable training through clearly conceiving some interesting end toward which he directs his present activity and from which the latter derives interest. The writers on motivation have emphasized the desirability of well defined pupil purposes and whole-hearted interests as educative factors. Motivation thus becomes one phase of the doctrine of interest. . . . Motivation is quite a different concept from project teaching, in which the central element is the contriving, devising, and planning by the pupils of some practical activity,—something to be done.

There is some quibbling as to whether *purposes* are *motives,* and whether all *motives* are *purposes.* Certainly purposes are motives, though there may be other motives than purpose. It is also said that *to motivate* indicates teacher domination and direction of the learning process. To motivate means simply to furnish with a motive. Motives can be supplied by the teacher, by the situation, by the learner himself. To possess a motive is to have an urge, a desire, a drive, a purpose. There is nothing in the concept motivation that, of necessity, demands teacher domination. Purposeful activity is activity in which there is urge, desire, drive—motive. Whole-hearted purposeful activity is well motivated activity. The term *whole-hearted purposeful activity* describes admirably and forcefully an important aspect of all learning, namely, that learning must be interesting, impregnated with pupil interest and desire—be well motivated. It is a new name for an old concept. In so far as it renews attention to pupil centered lessons, to pupil motives and drives, it is extremely valuable. Used as a definition of the project, it is a source of confusion and argument.

Wilson on motivation and the project. An interesting incident bearing on this question occurred at a sectional meeting of the National Education Association in 1922. After a paper by Kilpatrick setting forth the definition of project as whole-hearted purposeful activity, Dr. G. M.

Wilson, co-author of a book on motivation, asked if Dr. Kilpatrick would state explicitly the difference between his new concept, "whole-hearted purpose," and the concept motivation as commonly used. Kilpatrick replied with some vigor that he was not concerned with quibbling over definitions or labels, but was interested in emphasizing an essential characteristic of good learning. This view he later embodied in his book: [20]

> If I were more concerned with objective labeling than with anything else, I might be concerned. But it so happens that I am more concerned with the learning of my pupils than I am in what you call objective labeling. I wish then a term that points to what I conceive to be the essence of the learning process, the learning attitude.

The necessity for definition. Shall we agree that "objective labeling" and definition are of less moment here? Dewey [21] sharply criticizes lack of clear definition of meaning.

> A constant source of misunderstanding and mistakes is indefiniteness of meaning. Through vagueness of meaning we misunderstand other people, things, and ourselves. . . . Vagueness disguises the unconscious mixing together of different meanings, and facilitates the substitution of one meaning for another, and covers up the failure to have any precise meaning at all. It (vagueness) is the aboriginal logical sin—the source from which flow most bad intellectual consequences. . . . To be clear and perspicuous a meaning must be detached, single, self-contained, homogenous, as it were, throughout. . . . The process of arriving at such units of meaning (and of stating them when realized) is *definition*. . . . The tests of the distinctness of a meaning is that it shall successfully mark off a group of things that exemplify the meaning

[20] From W. H. Kilpatrick, *Foundations of Method* (1925), Ch. xxi. By permission of The Macmillan Company, publishers. Read also Wilson and Wilson, *Motivation of School Work* (Houghton Mifflin, Co., revised, 1921), Ch. xiii.

[21] John Dewey, *How We Think* (D. C. Heath Co., 1910), pp. 129-130.

from other groups, especially of those objects that convey nearly allied meanings.

No, we must define. The foregoing pages devoted to the definition of the project are not wasted. Definition is necessary for clarity of thought and for coöperation in practice. On the basis of (1) historical origin and usage, (2) etymology of the word, and (3) logical analysis of the psychological concepts used, it would seem that the *project should be defined as a practical problem.* It is a question of problem solving. Its direction involves the elements already set forth in Problem 4 of this unit.

In regard to the other definition, let us repeat what was said earlier: whole-hearted purposeful activity is an excellent description of *all* good learning situations. The author of this definition has classified *all* learning types (see Problem 6, this unit) under it. Defining the *project* as *whole-heartedly purposeful activity* begets a two-way confusion. First, the word *project* already has another logical, legitimate, and accepted meaning. Second the term *whole-hearted purpose* is readily identifiable with still another meaning, namely, that connoted by the terms *interest* or *motive.*

Criticism of the project because of its origin in manual activities. As the historical survey indicated, the project method was born in the field of manual training and was chiefly used for a long time in the field of agricultural and vocational education. Some critics decry it as being confined to manual activities. A few individuals advocate that it be confined to the vocational fields. Neither is correct. The central element in the project from its earliest inception has not been manual manipulation, motor activity, but the problem solving which precedes and accompanies the making of things, the carrying out of practical activities. It is true that projects are practical problems, hence an objective outcome is expected as con-

trasted with a logical belief or conclusion which is the outcome of the theoretical or speculative problem. A contrast may assist in making this clear. Such questions as the following can be made interesting and vital, real problems for the learner: "Why can New Zealand sell butter more cheaply in Portland, Oregon, than can the Oregon dairymen?" "Let us see why Russia wants India"; "Why did England colonize in America?" Real problem-solving thinking will result, but the answer is theoretical—a logical conclusion. Nothing can be done about it. No doing or action results. The project is a problem which results in doing. Let us repeat, the motor element is not what makes the activity a project, but the problem solving of a practical nature accompanying the activity.

Early lists of projects included such things as making a bookcase, a work table, repairing a desk, raising an acre of corn, making a playground slide, etc. However, the term is not to be confined to the industrial or vocational subjects. Modern lists include historical construction projects, so that history lessons may be illustrated in the sand table; working out and putting on a dramatization (involving oral and written expression, study and reading, costume making, constructing scenery, etc.); publishing a school paper; arranging and carrying out special day programs; carrying out a program for beautifying the school grounds; organizing and carrying out a campaign against codling moths; etc., etc. In all these the emphasis is on pupil planning, devising, scheming—practical problem solving. Doing may be of the creative or dramatic type, as well as what is commonly called manual. Experienced teachers will have recognized that they have been doing project teaching for some time without knowing it.

The relation of the project to the older organizations of learning. A project may be either a group or an individual undertaking. It may be an individual undertaking

with group relationships. In either event it is a unit of work extending over some time. It is a program of importance, involving tangible worth while results. It differs from an "exercise" in that the latter is short, and usually one of several similar cases designed to introduce a new process, or to give practice in applying a rule. The project differs from the traditional conception of *lesson* in that it covers more time and involves more material. It differs from a series of lessons in that it is one coherent, interwoven whole. It is of interest to note that the European use of the word *lesson* has usually indicated the treatment of a whole topic as differentiated from the American usage indicating a daily recitation. A British teacher once submitted to me what she called an account of a *lesson* on the Feudal System. It was a treatment of the whole topic, divided into excellent subproblems, and requiring many days to compete. The project is something like our *topical* treatment, a *lesson* in the European sense, except that topics are usually organizations of subject matter in adult logical form. The project must be a pupil-centered problematic activity, with subject-matter organization secondary to the natural process of problem solving. The project, like any large problem-solving sequence, can be divided into a number of subproblems.

This seems to involve no new principle of learning, but it does involve a marked and important redistribution of emphasis. By organizing work into larger units, preferably involving group activity, learning more nearly approximates the conditions of real life. In the world, people pursue the solution of their problems over the course of weeks, months, years. All the principles of reflective thought, of motor learning, all the implications of natural interests and of individual differences, etc., are manifest in the everyday activity of people. Life is a process of learning through carrying out the projects of the individual. By organizing

school learning into projects the teacher is forced away from emphasis on some particular lesson type or principle of learning, and is enabled to view large units of activity that will involve several or all the principles of learning—each in its proper relation to the whole, each with the amount of time and emphasis that it actually deserves. The very essence of the project method seems to be, not that it brings to light a new and unusual principle of learning, but that it provides more easily and efficiently for the proper functioning of those we already know about. Considered in this light, Bagley ranks the project as "a constructive achievement of the first magnitude."

In organizing her work into projects, the teacher must have a broad view of the course of study and must realize the intimate relationships that so-called subject matter has with life. Not only must the professional training of the teacher be better, but also her general education must be broad and diversified. Given the view of subject matter and life that is necessary, the teacher must look around for points of contact between the pupils' lives and experiences and the body of material that they must acquire during the course of their school days. She should also be on the alert for projects that pupils will themselves initiate, since these will be the most efficacious. However, it is legitimate to so manipulate the situation that the learners will appropriate and make their own, projects which they probably would never have discovered. The same point is involved here as in smaller problems, namely, that although it is best to work upon problems or projects discovered by the learner, nevertheless efficient work and worth while learning will take place during the execution of problems and projects introduced by the teacher.

Once the problem is realized, the teacher and class should work out a method of attack that would probably involve dividing the big undertaking into a number of smaller units

for smaller groups or for individuals. Here will be involved in greater or less degree the principles of reflective thought, of assignment and study, sometimes of drill. Carrying the plan over into action will further involve these principles, plus those of motor skill, interest, individual differences, self-activity, etc. As has been stated, all these principles will enter into the learning process in their proper places and as contributions to the big movement. In the analysis of the problem, in the presenting of evidence, and in the summarizing there will be much opportunity for the socialized or contribution recitation, training in expression, etc. Many of the lessons in the course of the project will partake of the nature of the well-known type lesson.

The project as a method of teaching and as a type of organization for subject matter. It will be noted that in many of the discussions of this topic, the word *project* is used, by the different writers, sometimes as if it designated a method of procedure, sometimes an organization of subject matter. *Projects* are organizations of subject matter of a certain type. The *project method* involves the use of these organizations in teaching.

A project, when organized, will involve parts of many subjects; the use of projects will call for the application of many principles of learning. Projects will use arithmetic, geography, history, drawing, handwork, etc., as each is necessary in the completion of the activity. The whole is woven into a coherent unit of work, organized around a purpose or a problem as a core, inviting the enthusiastic participation of the learners. Such an organization bears a slight and superficial resemblance to the early Herbartian schemes known as *concentration* or *correlation of the studies,* but differs most vitally in that the project is organized in terms of pupil activity and actual-life situations. The earlier schemes were purely in terms of subject matter. The project is usually shorter; it should not become fixed

and formal but remain a living progressive thing, organized anew and differently by each group of pupils and in terms of each situation.

Bagley [22] sounds a caution against the too complete abandonment of systematic subject organization, saying:

> It is because the project method . . . breaks up the continuity and organization of subject matter that it is inadequate, I believe, for the effective treatment of those subjects, the soul and substance of which is continuity and coherent organization. History is one of these subjects, and probably the most significant from this point of view. But as I have suggested, there is a place for logical organization and systematic treatment in practically all of the content subjects.

The other side of this point is presented by Parker: [23]

> There is another way of thinking of the meaning of *logical,* however, and that is in terms of the kind of thinking that the student does. From this point of view a student who memorizes completely the attractively organized and coherent system of some textbook in chemistry or of a Euclidean geometry may not have done any logical reflective thinking at all. He may have no appreciation or understanding even of the steps of connectedness in the system that he has learned. On the other hand, a student who is presented with certain problems concerning ventilation or food supply, for example, and has to search for relevant material from various sources, may be doing the highest grade of logical reflective thinking. If he keeps his problem clearly in mind, if he searches for evidence, if he evaluates this in an unbiased manner, if he rejects irrelevant material, if he arranges and organizes his ideas, if he formulates and verifies his conclusions, he is being logical in the highest sense; he is being scientifically minded, he is acquiring skill in the use of the scientific method, and he is on the right road to become a scientist.

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[22] "Dangers and Difficulties of the Project Method and How to Overcome Them—A Symposium," *Teachers College Record,* Vol. 22, No. 4 (September, 1921), pp. 283-321.

[23] S. C. Parker, *Methods of Teaching in High Schools* (Ginn & Co., revised, 1915, 1920), pp. 91-92.

The artificial separation between subjects as now organized is broken down, and this is thought by some to be one of the most important contributions. The separation between subject matter and method is also in some measure corrected.

The project method, on the other hand, involves, as has been previously emphasized, all or many of the known principles of learning, each in its proper place, each making its contribution to the complete unit of activity. Each day's work, the different units of accomplishment in the course of the project, will utilize learning by reflective thought, by imitation, and by drill as these processes are necessary. There will be assignments, supervised-study periods, socialized recitations, and other lesson types, as well as attention to individual interests, differences in capacity, and other principles of learning.

The tendency seems to be to reserve the term *project* for the unit of subject-matter organization, and to substitute for *project method* such terms as *teaching by projects, the use of projects in teaching, teaching through projects,* etc.

Limitations of the project method. Many enthusiasts at first claimed that full utilization of project teaching would do away with most of the other lesson types and teaching methods. A good part of life is, in fact, made up of planning and carrying out practical problems, of prosecuting one's projects. By organizing learning into projects, the school approximates life and uses the methods of life. But there is much in life that does not consist of planning and carrying out projects. All of us have routine work to do. A large part of the work of artisans, clerks, bookkeepers, librarians, teachers, farmers, housekeepers, even executives, and scientists consists in routine manipulation of facts and materials. Skill must be acquired in these activities. To be sure, much drill and skill training can be carried on within the project, but even under the best

conditions there will still be drill exercises on essential skills and associations. There will be other shorter organizations of subject matter for various reasons. It is to be noted that coincident with the interest in the project with its emphasis on planning, organizing, and problem solving, the other major movement in the field of method at present stresses the acquisition of individual routine skills. There is great emphasis on individual diagnosis and prescription of remedial drill exercises based upon analysis of the pupil's individual difficulty in reading, writing, arithmetic, and spelling.

The project organization of material should undoubtedly take over a large amount of time now devoted to shorter organizations and more or less isolated lessons. Many practical difficulties stand in the way. Courses of study will have to be rewritten, administrative machinery will have to be reorganized, and systems of thought possessed by some administrators will have to be remodeled by study and experimentation. There are at present also, limitations in teacher training and in materials and supplies available that will make the method quite impracticable in some situations. In the hands of competent and highly trained teachers, project teaching undoubtedly achieves highly desirable results. It is doubtful if beginners should try very extensive project organizations until they have mastered the routine direction of classroom situations.

Experimentation is under way and much will be learned from that. But in many schools, organization of the subject matter into projects should proceed rapidly. In an excellent treatment, Bonser points out that progress in curriculum making is away from formal organization and toward the project organization. He takes a middle ground and points the way toward project organization with due regard to difficulties in breaking with the traditional outlines. A caution should be sounded here against organizing

cut-and-dried projects and project curricula. Care must be taken that the project does not degenerate into the thing it is to cure, a fixed and formal statement of subject matter.

Evaluation Exercise for Problem 4B

Go to the library and examine at least three outlines or descriptions of specific projects. These are usually in terms of subject matter to be covered. Some will have statements of problems and subproblems, suggestions for motivating, organizing, securing pupil participation, etc. In any event, prepare to present a critical evaluation of these samples in the light of the following questions. Add any comments which appear to you to be important but which are not covered by the questions.

1. Is the project worth while? Does it really approximate life, in so far as school conditions permit? Consider both objectives and method?
2. Is the plan or outline well organized and coherent? Does it avoid far-fetched connections and unlikely relationships?
3. Is each part (problem, unit, day's work, etc.) related functionally to the rest? Is it likely that the pupils could make the connections themselves quite naturally?
4. Is subdivision of the work among individuals or committees indicated or easily provided for?
5. Is the problem one which pupils would likely initiate themselves? Accept readily if the stage is set properly by the teacher?
6. Is undue emphasis on some one phase or one subject avoided?

Observation Exercise for Problem 4B

In observing class work on a project it will be necessary, first, to determine what phase or stage the pupil is on at the time. This determined, the work of individuals and groups should be observed in the light of the appropriate guide questions. Any of the observation outlines given in Units I or II will serve. Select the one fitting what is being observed at a given time.

Parallel Readings for Problem 4B[24]

1. Bonser, F. G., *The Elementary School Curriculum* (Macmillan Co., 1920). Excellent statement looking toward project organization but still preserving what is of value in the traditional curricular organizations.
2. Branom, M. E., *The Project Method in Education* (Richard G. Badger, 1919). Performs a real service in discussing various definitions of the project. Excellent summary of various interpretations. Discussion of specific projects not so clear, but nevertheless suggestive. Lengthy bibliography. Somewhat outdated now.
3. Coe, George A., *Law and Freedom in the School* (University of Chicago Press, 1924). Intelligent statement of the necessity of law and control in the school room.
4. "Dangers and Difficulties of the Project Method and How to Overcome Them—A Symposium," *Teachers College Record,* Vol. 22, No. 4 (September, 1921), pp. 283-321.
5. Freeland, G. E., *Modern Elementary School Practice* (Macmillan Co., 1919). Not so clear in defining project, but describes some good projects.
6. Hosic, James F., "An Outline of the Problem-Project Method," *The English Journal,* Vol. 7, Nov., 1918, pp. 599-603. A series of clear-cut theses covering the entire theory of the project. Excellent.
7. ——— and Chase, Sarah E., *Brief Guide to the Project Method* (World Book Co., 1925). Accepts Kilpatrick's definition, rejecting the other for no very clear reason. Logical and helpful treatment of its accepted definition.
8. Kilpatrick, W. H., "The Project Method," *Teachers College Bulletin,* Tenth Series, No. 3. Best statement of the point of view of those who stress the subjective or pupil-purpose side of the project.
9. ———, *Foundations of Method* (Macmillan Co., 1925), Chs. xiii, xxi. Excellent discussion of the *purposeful activity* definition.
10. Lull, H. G., "Project-Problem Instruction," *School and Home Education,* Vol. 38, Dec., 1918, pp. 79-83. Good discussion and summary of points in a score card.
11. McMurry, F. M., *Elementary School Standards* (World Book Co., 1914). Excellent discussion of course of study and les-

[24] *Note:* A complete bibliography on the project method would run to nearly one thousand titles. The few given here are merely to direct those interested to the literature of the field. References 2, 13, and 20 contain lists running well into the hundreds and every phase of the topic can be located in those lists.

sons that can easily be adapted to project organization and teaching.

12. McMurry, C. A., *Teaching by Projects* (Macmillan Co., 1920). Excellent discussion of specific projects.
13. National Society for the Study of Education, *Nineteenth* and *Twentieth Yearbooks,* Part I in each (Public School Publishing Co., 1920, 1921). Both contain samples of specific projects, over two hundred in all. Immediately usable by the teacher. Lengthy bibliography.
14. Parker, S. C., *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919). Concrete, well illustrated discussion, Ch. v.
15. ———, "Project Teaching: Pupils Planning Practical Activities," Parts I and II, *Elementary School Journal,* Vol. 22, January and February, 1922, pp. 355-345, 427-440. Two valuable articles. Great amount of material presented briefly and concisely.
16. Reudiger, W. C., "Projects and the Project Method," *School and Society,* Vol. 14, October 1, 1921, pp. 240-243. Says there has been much furor and little contribution on project. Indicates relationship to other educational principles. Interesting and worth while.
17. Ruch, G. M., "A Contribution to the Psychology of the Project Method," *School and Society,* Vol. 11, March 27, 1920, pp. 386-389. A concise statement showing clearly relation of project method to problem solving. Valuable.
18. Stevenson, J. A., *The Project Method of Teaching* (Macmillan Co., 1921).
19. Stockton, J. L., *Project Work in Education* (Houghton Mifflin Co., 1920). Difficult reading.
20. United States Bureau of Education, "List of References on the Project Method in Education," Library *Leaflet* No. 9. An excellent bibliography arranged in classes, making material in any subject quickly available.
21. Wilson, H. B. and G. M., *The Motivation of School Work* (Houghton Mifflin Co., 1913, revised, 1920). Excellent discussion of both motivation and the project.

PROBLEM 5

HOW ARE DESIRABLE EMOTIONAL RESPONSES DEVELOPED AND ACQUIRED?

Section 1: Introduction

Exploratory and Pre-Test Questions

None. Proceed to study of the text.

The desirability of emotional learning. Most books on method discuss a lesson called variously, *the appreciation lesson, the enjoyment lesson,* etc. The central element in these lessons is a response of feeling or emotion. When it is considered how tremendous a part emotion plays in the direction of human affairs, it would seem that an important task of education would be the education of feeling, training in proper emotional response. On this point, Thorndike [1] says:

> The work of education is to preserve desirable instinctive emotional responses by giving them exercise and rewarding them with pleasure, to eliminate the unfit ones and to form habits of feeling the right feeling at the right time. . . .
>
> Some of the most beneficent qualities of human nature are given by nature in the (capacity to respond with) sympathy, courage, joy, maternal love. . . . If the life of the classroom is destitute of sympathy, happiness, courage, and love, it is offering a pitifully inadequate education. Good teaching will provide exercise for these (emotional responses) as well as for the more intellectual capacities.
>
> So also envy, jealousy, fear, delight in cruelty, and the like must be eliminated as well as ignorance and disobedience. Good teaching will substitute honest rivalry and sympathy for envy and jealousy and inhibit delight in cruelty by cultivating the opposing habits of care and protection.

[1] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler, 1906), pp. 198-199.

Lack of explicit discussion. The school has not done well in educating the emotions. It is significant that none of the books on method discuss the matter very helpfully. It is doubtful if any one can at present. This is due to three facts. First, emotion is the most uncertain and erratic of all psychological processes. Emotional reactions are influenced by the most delicate stimuli on one occasion, refuse to react to severe shocks in another, take one direction to-day and reverse this to-morrow upon receiving identical stimuli. Second, less is known about the control and guidance of this recondite and uncertain phase of mental life, than of any other. Third, emphasis in school has been upon intellectual, utilitarian and objectively measurable results.

Two objectives are involved. The psychology involved is extremely technical and details will be omitted here. Supplementary assignments are provided at the close of this section for those instructors and students who wish to study the background presented and the basis for the statements herein made. After a brief summary we will proceed to a discussion of the pedagogical problems and implications.

Analysis of both the psychology involved, and of the attempts of various writers to discuss *appreciation* lessons, suggests the thought that perhaps there are two distinct aims to be achieved. Some writers discuss one, some the other, still others seem to have both in mind but do not clearly distinguish between them. It may be possible to clarify the matter by saying that responses of feeling or emotion are of two types (1) ideals, sentiments, attitudes of appreciation, standards of taste which control thought and action, and (2) habits of enjoyment. Thorndike [2] seems to imply this [*italics* are mine]:

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[2] *Op. cit.*, p. 202.

That is good teaching of art which makes it *either* a stimulus to better conduct, *or* a means of noble, because impersonal, pleasure. . . .

The function of emotions should be to rest and recreate body and mind *or* to impel to and invigorate thought and action.

In another technical and extremely difficult essay, Thorndike distinguishes between *real* emotions and *pseudo* emotions. The real emotions are *bona fide* feelings, actual attidues toward the world. They lead to action. Thorndike illustrates this with the story of the unsophisticated countryman who leaps to the stage at the theater to thrash the villain who is abusing the heroine. By pseudo emotion, Thorndike means the æsthetic emotions. Those of us who go to the theater, enjoying the duels without fear of pain or death, getting the joy of conflict without its tremors, thrilling with excitement that does not stimulate to effort, etc., are experiencing pseudo emotion. Our pity is not real pity, our sympathy for the heroine does not impel us to do anything about it. On the basis of his psychological analysis, Thorndike believes the pseudo emotions developed out of the play of childhood, and that their function is to give innocent pleasure, pure enjoyment. In his presentation there seems to be a basis for two types of emotional learning, (1) those involving genuine emotion and affecting conduct, and (2) those of enjoyment.

As stated above, various writers have stressed one or the other, sometimes both without clear distinction. Parker, greatly influenced by Thorndike, changed "noble, impersonal pleasure," to "habits of harmless enjoyment," and in his first book on method included an excellent account of how to train these habits. In this volume, however, there was no further discussion of any other type of emotional learning, nothing on acquiring ideals, standards, attitudes that affect conduct. In his second volume, published eight years later, there is not only a much improved chapter on

"harmless enjoyment," but also a chapter entitled "civic-moral ideals and efficiency." The latter chapter presents as one of the fundamental factors involved in moral behavior, the enthusiasm, sentiments, and ideals of the individual. These are partly intellectual, to be sure, but highly emotional also. Monroe reverses Parker's first procedure, devoting a chapter to "directing the acquisition of general patterns of conduct," but saying nothing about enjoyment. Foster's discussion is somewhat confused through use of the ambiguous word *appreciation* but quite clearly discusses two types of emotional responses which he calls *æsthetic* and *ethical*. Similarly Wilson, Kyte, and Lull discuss both enjoyment or pleasure, and the control of conduct by emotional standards. These authors regard the two as closely related, those things one *enjoys* exerting a strong influence on the things one *does*. Waples criticizes Parker's substitution of *enjoyment* for *appreciation* as confused with *motivation*. He retains the term appreciation, and distinguishes two types, *technical* and *æsthetic*. The latter he thinks of as comparatively independent of knowledge, the former not to be had without some knowledge of the object appreciated. Both types of learning, as discussed in preceding pages, seem to be implicit in his presentation. Morrison has one inclusive discussion, "the appreciation type," but distinguishes between "æsthetic pleasure" and "right attitudes toward conduct."

It will be desirable and profitable to summarize the preceding discussion at this point as a basis for what is to come. That learning which involves a predominant emotional element, seems to have clearly two objectives:

1. Ideals, sentiments, interests, standards of taste, attitudes, all of which are emotionalized controls of conduct.
2. Habits of worth while enjoyment, emotional responses of pleasure or fun.

We need not be concerned here with technical arguments as to the nature of ideals, sentiments, attitudes, etc., or with arguments as to whether they may be thus grouped together. For practical purposes we may regard them as similar emotional responses with a marked effect on the control of conduct. Conduct here is not to be interpreted narrowly as moral conduct in the colloquial sense, though that is important, but in the psychological sense of behavior. Controls of conduct affect, therefore, not only moral conduct, but reactions to everyday situations; such as common courtesy, choice of color combinations in interior decoration, in dress design, choice of arrangement and color in architecture, in landscape gardening, in short, all responses in which emotion or æsthetic factors as contrasted with intellectual factors, play a large part. In some of these situations, obviously, enjoyment plays an important part.

In regard to enjoyment, Thorndike used the term *noble pleasure*. Parker substituted *habits of harmless enjoyment*. This has been criticized as merely negative, such terms as *beneficent* or *worth while* being suggested. It is well not to waste time quibbling. Harmless is a negative term designed to rule out injurious or detrimental habits that might be very enjoyable. The term was designed also to focus attention on the "just for fun" or pure enjoyment aim, as opposed to the more sober utilitarian aim of most school work. However, for those who wish other results than "mere" fun, enjoyment is obviously beneficent or worth while. Certainly habits of enjoyment involving outdoor exercise are beneficial to health and efficiency. Habits of enjoying the reading of good literature, incidentally, supply one with much information. As indicated above, pleasure is often one of the criterions of taste. In any event, inculcating habits of enjoyment is a legitimate end of education. Certainly detrimental habits are to be barred,

but the others need not have consciously a further utilitarian end.

Occasional confusion of the two aims. There is considerable confusion regarding the relation between enjoyment reactions to art and literature, and the derivation of ideals from art and literature which are to affect conduct. The lay public and many teachers believe that the contemplation (enjoyment) of good art and literature inspires one with the desire and endeavor to work for high moral ends. They believe, also, that idealistic production connotes the counterpart in the author or artist. Teachers who believe this attempt to arouse real emotion in their teaching of such material. This confusion is to be seen in one or two recent volumes in method.

Obviously there is no necessary relation between high art and morality. Some of the most beautiful pieces of literature, architecture, and painting have been produced in vicious and violent times, by lawless and immoral groups. The names of great writers and painters who were personally dissolute and immoral are common knowledge. On the other hand, the Puritans who frowned upon much art and music, particularly upon æsthetic enjoyment, were severely moral.

It is, of course, quite true that the reactions resulting from contemplative enjoyment of art and literature may, and often do, influence conduct, but there is no reason to believe in necessary, automatic carry-over. In the quotation from Thorndike above, he says good teaching of art is *either* a stimulus to good conduct *or* a means of pleasure. Herein lies the key to the problem. It is better to envisage two separate and distinct aims in any emotional learning, as set forth in the preceding pages. This tends to eliminate confusion. Literature and art can be used for enjoyment. That is one good and sufficient aim. Literature and art can also be used in setting up controls of conduct. That is

a second good and sufficient aim. Their use in the latter case will be as parts of a larger process, and the technique will be more complicated than in producing enjoyment. This will be treated in detail later. On these general points Thorndike [3] says:

> Except by special dispensation they (pseudo emotions) do not serve to purify the mind of their real parallels. There is no reason why they should and no evidence that they do. Nor do they serve to predispose the mind to their real parallels. . . . When a child's emotional make-up is changed by the books he reads, it is the real emotions, or, more often still, the ideas aroused that do the work. The function of the pseudo emotions is simply to give innocent pleasure and to be symptoms that the mind is at least healthy enough to enjoy unimpeded action. . . . Play on, children of all ages, says the wise man. Only do not imagine that you are saving your souls or remodeling your minds by the game.

Sharp distinction between the two aims, with resultant clarification of technique, should save much muddling and confusion.

Direction of the learning process. We are severely handicapped in attempting to say how emotional responses should be acquired. We can say with some definiteness and some certainty how the learner may be guided in acquiring motor skills, or in learning to solve problems. Not so with emotional learning. However, some factors may be tentatively differentiated.

The fact that all ideals, standards, tastes, and enjoyments are partly intellectual and partly emotional, plus the fact that emotion accompanies cognitive processes, and does not exist alone, suggests that much emotional learning may be a concomitant of lessons aimed primarily at something else. On the other hand, many emotional learnings may

[3] E. L. Thorndike, "The Æsthetic Emotions," *Teachers College Record,* Vol. 2, 1901, pp. 195-200. Available also in Parker's *Methods of Teaching in High Schools,* pp. 244-250.

and can be acquired by direct attack, involving explanation, understanding, deliberate preparation of situations demanding the desired emotional response, repeating these opportunities so that the reaction may be reasonably certain to occur.

There are certain principles which affect either type of emotional learning equally. That is, whether we are attempting to build up ideals or enjoyment, certain general laws will aid the teacher. In addition, the two objectives each involve principles and procedures peculiar to themselves. Because of the tentative nature of this whole discussion, and because of the constant danger of confusion, the application of general principles will be discussed separately in relation to each objective. Only a small part of the ensuing discussion is original. The principles have been gathered from many sources as indicated by the bibliography. Some principles have been reproduced as found, others altered.

Use of the term "appreciation." It will have been noted that the word *appreciation* has been omitted from the heading and discussion of this problem. Though still almost universally used, a better term is needed. None has as yet appeared but any new designation should, it would seem, focus on emotional response as the central factor.

The chief objection is that *appreciation* can be purely intellectual in its reference, or purely emotional. Both uses are legitimate. In problem solving we may *appreciate* the value of a certain statistical table, that is, intellectually understand its place in the process, its weight as evidence. We have emotional reactions of pleasure or displeasure, but that is beside the point. The word here signifies an intellectual response. On the other hand, we may *appreciate* the beauty of a painting, of a mountain peak, the kindness of a neighborly act. This usually means that we like

it, enjoy it, feel pleasure over it. The word here signifies an emotional response. Some technicians would still further complicate matters by using the word to mean either understanding or liking for technique (as in painting or singing), even though one did not understand or like the theme.

What is commonly meant by *æsthetic appreciation* can be determined better by utilizing the terms of the present discussion. An *æsthetic appreciation* is an emotional reaction. It may exist purely as enjoyment. It may also lead us to choose, to control conduct. A standard of æsthetic taste is not merely a standard or a taste. It may result either in enjoyment or in impetus to action.

It is to be hoped that a happy phrase will be evolved. Meanwhile, we will conduct the present discussion with such terms as *emotional learning, emotional responses,* etc.

Discussion Questions for Summarizing and Testing on Section 1

A number of students should answer each of the questions, and their illustrations should be discussed by the class.

1. Give two, if possible three, incidents from life, illustrating real emotion stirred by some piece of writing, acting, painting, or by any other material capable of stimulating emotional response.
2. Do the same for pseudo emotional response. [You will have to describe your own reactions here. Make an effort to describe as accurately as possible.]
3. Recall your experience in high school or college with studies involving emotional response.

a. Select a few examples of poor teaching (aimed either at ideals or enjoyment). Describe and analyze, showing why the lessons failed.
b. Do the same for a few examples of very successful teaching, showing why they were successful.
c. Describe specific cases in which the teacher was obviously confused as to aim.

Parallel Readings for Section 1

While technical background is not absolutely necessary in the introductory discussion, instructors who wish may refer students to:

1. Thorndike, E. L., *Principles of Teaching* (A. G. Seiler, 1906), Ch. xii.
2. ———, "The Æsthetic Emotions," *Teachers College Record*, Vol. 2, 1901, pp. 195-200. [Reproduced in Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), pp. 244-250.]

Section 2: The Teaching of Ideals, Attitudes, Standards of Taste

Exploratory and Pre-Test Questions

1. Why does one whistle while going by a cemetery? Interpret this fully in terms of its effect upon emotional states.

2. Two Italian boys of good family were entered in a somewhat exclusive private school. They were well bred, amiable, intelligent boys but were not well received by the American boys and girls. There was a tendency to leave them out of things, to be a bit snobbish, and soon the epithets "wop" and "guinea" appeared. The general attitude was one of mild contempt for those of an inferior nationality.

A teacher sought for a way to arouse a better spirit, and eventually planned history and literature discussions of contributions of different nationalities to history and progress. Coming to the Italians in due time she bore down hard. As item after item of artistic and musical superiority was noted, as the great part played by Italy in early discovery and navigation was realized, some pupils began to cast mystified and somewhat respectful looks towards the two Italians. It was obvious that a few pupils "wished they hadn't" when they thought of some past incidents.

a. Will such procedure do any further good, do you think?
b. Analyze her procedure carefully and in detail, showing item by item whether it was sound psychologically and pedagogically or not.
c. Would a formal lecture on tolerance have produced the same or different results?

3. In Victor Herbert's opera, *The Rose of Algeria,* the hero is reluctant about proposing to the heroine whom he loves. His friend suggests that he propose to her while the orchestra is playing. Why do you suppose this suggestion is made?

4. Two little girls in a Sunday School class had a bitter quarrel after which they refused to speak to each other. All the children knew about it and so did the teacher. The next time the children repeated the Lord's Prayer in unison, the teacher forbade the two girls who had quarreled to say the words "forgive us our trespasses as we forgive those who trespass against us," until they made up.

a. What do you think the teacher was trying to do?
b. Was her procedure a wise one in view of the aim?

5. What is the significance for teaching in the fact that many millions of people go daily to the movies, while only a few thousands go to the art galleries?

6. Many schools have clean-up campaigns, either for school grounds or for the town. During the war the government made every effort to get wide distribution of ownership for liberty bonds, war savings, and thrift stamps. Similarly, we were asked during the war to eat less of certain foods and more of others, so that supplies could be conserved.

What other learning results might possibly have been achieved besides those directly desired?

7. A teacher trying to build a sense of honor among her pupils condemned the continual tattling among them, and refused to listen to their tales. An excuse for absence was handed to her and another pupil whispered to her that it had probably been faked by the absent pupil's sisters. Sure enough, the teacher found three handwritings in the letter. Under these circumstances what should the teacher do?

8. A primary pupil visiting her former teacher said, "Oh, we have it lots easier now. You used to make us get everything, but Miss A—— doesn't care whether we get anything or not." List several possible learning results in each case.

Conduct controls are complex, involving (1) ideas, (2) feeling, and (3) habits of carrying the emotionalized ideas over into action. As indicated above, either incidental or direct teaching may be utilized.

Incidental teaching. The general law here would seem to be to select subject matter, problems, skills, etc., to be studied, that are likely to arouse desirable emotional attitudes, ideals, and to build up desirable standards of taste. We utilize here the fact of varied learning response (Problem 4, Unit II). Three things may be reëmphasized. The importance (1) of the teacher's personality and method, (2) the setting for the learning situation, room, pictures, flowers, etc., (3) providing numerous situations which should give the desired concomitant opportunity to function.

Bagley and Keith [4] make an important suggestion in calling attention to the fact that certain secondary schools in England—Eton, Harrow, Rugby—are noted for inculcating certain ideals and conduct controls. Certain private schools in America have achieved wide-spread reputations for developing certain attitudes and standards. Just how is this done? We cannot be sure. It is in part incidental, a general response to the total environment. It is in part direct, in that ideals are sometimes discussed specifically, and in that nonconformers are noted and often punished. Monroe, discussing this illustration, distinguished three important factors: [5]

> The pattern of conduct represented by the tradition is clearly defined, it has the support of public approval, and violations of it are not allowed to pass unnoted.

Even though clearly defined ideals exist and violations are explicitly attended to, there is no teaching in the ordinary sense. The definition, support, and punishment are all cared for by the group, not by the teacher or other authority. One teachers' college undertook to control its students for its own ends by getting out a "tradition" book,

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[4] Bagley and Keith, *An Introduction to Teaching* (Macmillan Co., 1924), p. 252.

[5] W. S. Monroe, *Directing Learning in the High School* (Doubleday, Page & Co., 1927), p. 330.

and inviting all to coöperate in upholding the ideals set forth. Here was clear definition of the didactic sort. Furthermore, the "traditions" were obviously attempts to get the students to follow in paths desired by the authorities. As such they did not have public approval by the learner. The whole attempt failed. The guidance for the teacher is clear. Standards, ideals, attitudes must be an intrinsic part of the situation, clearly understood but not pedantically or "moralistically" presented and emphasized. They must be "in the air." The daily life of the teacher and of the schools must exemplify them. Their use must be real and not affected. They must be taken for granted. The assumption must be made that all well bred and intelligent people uphold them as a matter of course. This means that the ideals must not be artificial, arbitrary, or coercive, but really useful in the world. Thorndike [6] says:

> To take it for granted that high-school students expect to be honorable . . . to arouse the virtue of the gentleman and of the lady by behaving as if they already existed . . . is likely to be better teaching than any form of argument or legislation.

However, with groups who have never been in contact with good standards, or who are emotionally or volitionally weak, one cannot always rely on this. Some direct teaching will be necessary.

Morrison [7] emphasizes surrounding the child from the beginning with abundant opportunities to read good general and biographical literature, to hear good music. He stresses also the "specific influence of a valued personality," a tribute to the place and worth of the teacher in this subtle

[6] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler, 1906), p. 183.

[7] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Chs. xviii-xxi. *See also* B. H. Bode, *Fundamentals of Education* (Macmillan Co., 1921), p. 75.

business of developing tastes and appreciations. The surroundings are important also—"the school building should be a worthy and dignified example of architecture."

Direct teaching. In referring to deliberate attempts to teach ideals, tastes, or standards by direct attack, it is to be noted that these outcomes cannot be *assigned* for learning as are other desired outcomes. Monroe points out the absurdity of following the ordinary teaching procedure here, "for to-morrow enjoy this picture," "practice for five minutes feeling the worth whileness of neatness." The direct attack is more the concern of the teacher, perhaps, than of the learner. But even for the learner the acquisition of ideals may be furthered sometimes by deliberate analysis of facts and ideas involved. What are the general principles which may be of assistance?

1. *The learner must be interested and prepared.* To state an aim directly involving the ideal or standard would be pedantic and savor of old-time moralizing. However, the pupil must be interested in the learning exercise, no matter what its nature. Here he will probably be interested in the situation for itself, out of which he is to acquire the desired emotional response.

He must be prepared to understand what he will meet. An apperceptive background is as necessary here as anywhere. Again the informational preparation will probably be concerned with the intellectual elements in the situation. Certainly one does not experience feeling, nor form ideals, about things one is not interested in and understands little or nothing about. Standards of taste are in part intellectual and are affected by knowledge. There must be ideas about which to feel.

Sometimes interest and understanding are engendered by showing the learner explicitly that the ideal in question is useful in the world, and is of value to any one who is educated. This can be done without "pointing the moral."

At any rate, we attempt to utilize here, in terms of the specific situation and response desired, the general laws of motivation and apperception.

2. *The teacher must possess the desired ideals and standards.* A coach who is not "on the square" himself will never make his athletes realize the value of good sportsmanship, no matter how much he talks about it. Insincere teachers, given to partiality and favoritism, cannot inculcate the virtues of truthfulness and fair dealing. Those who do not "practice what they preach" will make little impression on young peole. It is a mistake to assume, however, that failure to practice what one preaches is so serious when teaching older and more analytic students. Such students are quite able to understand the preaching, to realize clearly its value, to grasp the ideas involved, to be motivated to action, at the same time understanding equally the weakness in the practice of the teacher. The suggestible students, of course, will be more influenced by the practice than the preaching.

Morrison says: [8]

> The teacher who is alive with the message of a poem or of a piece of music can apparently hardly fail to communicate its appeal to a class of boys and girls in the secondary school, if the latter are at all receptive. The teacher knows his material, senses its meaning and the value of its meaning, and is, therefore, himself in possession of the true learning product which is to be taught.

3. *Provide opportunities to meet and exercise the desired ideal, standard, or attitude.* According to Thorndike, man is so constructed as to be satisfied with some reactions, annoyed by others. In addition to the natural "satisfiers and annoyers," education has added other judgments of value, the presence or absence of which gives satisfaction

[8] H. C. Morrison, *The Practice of Teaching in the Secondary School* (The University of Chicago Press, 1926), p. 329.

or annoyance. The school should deliberately plan situations in which satisfaction will attach to certain desired reactions and vice versa. The story is told of a young mother who was advised by her physician to induce her small baby to eat much spinach. The mother decided to begin at once. She cancelled a bridge engagement, played with the baby for an hour before lunch, dressed the child in a favored dress, put on a gown herself which he liked, played music he liked, gave him a dish and spoon which were especially pleasing, ate spinach herself with apparent enjoyment. The baby "learned to like" spinach very easily. Satisfaction attended the desired habit. Of course, this is an odd case—rearing the baby took precedence over playing bridge—but the homely little story has lessons for the control of conduct in school. Teachers can introduce pupils under similarly favorable conditions to attitudes of thrift, honesty in examinations, desirabiliy of participation in civic affairs, etc.[9] It is incidental, perhaps, for the learner, but deliberately planned by the teacher.

What opportunities are provided by the school subjects themselves? Great claims are made by enthusiasts for various subjects. Thorndike[10] notes:

> If we are to believe them, arithmetic makes you truthful; science makes you patient; geography makes you love your neighbors in the Philippines as yourself; history makes you humble and brave and honorable; literature stirs every noble emotion and gives birth to all the virtues.

Two other interesting samples[11] are:

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[9] S. C. Parker, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923). Pp. 502-524 contain excellent concrete discussion of instances of training through actual exercises of the ideal desired. Well worth reading.

[10] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler, 1906), p. 189.

[11] Quoted by S. C. Parker, *Exercises for Methods of Teaching in High Schools* (Ginn & Co., 1918), pp. 12-13.

> In common with all sciences, training in Physics has a moral value. There is . . . a development of conscience to be got from the careful statement of exact laws. . . .
>
> English is almost the only opportunity available in the secondary school for acquainting pupils with the fundamental laws of art, which are also the laws of moral living.

Such statements are gross exaggerations. The opposite may even be true, the necessity for careful statement of exact laws poorly taught may lead to using "ponies" and others forms of cheating. Further, we know that, unfortunately, many school habits are confined to the specific stimuli which attended the learning. They are not generalized except by the upper levels of intelligence, or after conscious direction to generalization. Furthermore, we may know what is right and good from school studies, but feel no urge to do anything about it. Even if a feeling response is aroused, it may be an æsthetic one not predisposing to action.

But there is some truth in the claims. Civics can be so taught as to give the learner not only knowledge about good citizenship but the desire to have good government and to participate in the processes open to the average citizen. The school government can be of such nature as to give practice in the functions of the good citizen. The various fine arts in the school can be so taught as to give information, understanding, skill, and also taste—standards of beauty and harmony—that will affect the learners' response when called upon to decorate his own home, to choose styles of architecture, to decide upon designs and color combinations for his own garments. The characters of literature and history can be so studied as to give, in addition to intellectual outcomes, standards of conduct, courtesy, tact, truthfulness, courage. Such things as accuracy, persistence, neatness can be trained in school subjects, and made into general habits. Bagley's famous

experiment with neatness, showed that insistence upon high standards of neatness in arithmetic papers did not affect papers in composition, spelling, etc. But when specific attention was directed to the element of neatness itself, various degrees of carry-over were apparent. Often it is well to state explicitly the range over which an ideal may apply. The following suggestive list[12] of situations in which the standard of courtesy should apply illustrates this:

1. When speaking to his classmates, teachers, or other persons
2. During prayer or other devotions
3. When meeting or being associated with girls or women (applies to boys only)
4. When another person is talking—a classmate, teacher, visitor, or a speaker in a public place
5. When making a request of others
6. When friends are ill
7. When strangers or others make inquiries
8. When one is seated and an older person is standing because no seat is vacant
9. When other persons will be annoyed by whispering or other actions
10. When addressing a person or answering a question
11. When several persons desire to do the same things such as sharpen a pencil, or drink from the fountain
12. When entering a room or elevator accompanied by an older person
13. When eating lunch at school
14. When visitors are present at a recitation
15. When another person drops something
16. When handling books, pencils, and other articles

A certain school of educators will object to this as "pattern" conduct, limiting the individuality and repressing

[12] Upton and Chassell, "A Scale for Measuring Habits of Good Citizenship," *Teachers College Record,* Vol. 20, January, 1919, p. 59. *See also* H. W. Hughes, "A Rating Scale for Individual Capacities, Attitudes, and Interests," *Journal of Educational Method,* Vol. 3, October, 1923, pp. 60-61.

the intelligence of the individual. The truth is that many individuals will have more individuality and develop their intelligence by acquiring general standards, indicative of good breeding, that have stood the test of long usage.

Obviously, method is vital, but granted the proper method, the school subjects do afford opportunities for the learner not only "to know the right but to love it." The contribution of the school subjects will be both intellectual and emotional. In the *first* place, information is necessary and valuable. Facts gained from history and geography do much to remove misunderstanding. We are less suspicious and less likely to hate persons and things we understand. History supplies evidence that in the long run the moral good and the morally worthy act win out. The regard of the world on the average, and particularly over long periods of time, goes to the enduring and worth while, and not to the immediate and superficial.

Secondly, individuals from literature and history symbolize ideals much more effectively than can abstract principles. While biography has been badly taught by too analytic methods, it has undoubted values when properly handled. The tendency in youth to hero worship is real, and is a powerful ally of good teaching from history and literature.

In the *third* place, well written history and literature supply us with another pedagogical necessity—interesting, vivid descriptions and narratives. These fasten upon the imagination. Vivid ideas are always incitements to action. Parker tells how he and another boy helped an old lady carry a basket to her home, having just heard in school an interesting tale about a similar situation. Of course, this is just a part of it. There must be actual functioning in activity as part of the learning activity.

As stated before, there will sometimes be direct attack on the desired emotional response; sometimes mere contact

with the response will arouse it. Parker[13] summarizes thus:

1. Give pupils extensive knowledge of the intricate interdependence of human beings and of the forms of individual and group behavior that increase the [well-being] of the [race].
2. Give them skill in correctly solving civic-moral problems by practice in problem solving in school.
3. Cultivate in them enthusiastic, impelling beliefs in correct behavior and dislike of wrong behavior.
4. Give them opportunities to turn their beliefs into habits of action through actual practical behavior in and out of school.

Another interesting summary from Thorndike[14] says:

The best methods of securing the moral values of geography, history, and literature are not surely known. Our grandparents were taught to make solemn reflections on their duties; our parents had the moral of each event clearly pointed out; the best practice present is to allow or encourage such comments by the pupils as are expressions of real feeling but never to force them. . . .

In (conclusion) I venture to remind the reader that, quite apart from moral influences through direct training in conduct, specific lessons about morality and the moral significance of the usual school studies, school education has a high moral value. To give any one useful work to do in the world is in itself to help him morally. The school is thus a moral force by securing useful intellectual activity and encouraging habits of efficient work and worthy interests for leisure hours. Even though a school should restrict its direct aim to intellectual training and should never say a word or do a thing about virtues and vices, it would still make for morality in the sense that labor in business or in the household or impersonal activities of any sort make for morality.

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[13] S. C. Parker, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923), pp. 532-533.

[14] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler, 1906), pp. 193-194.

4. *Avoid vague, meaningless discussion of ideals.* There are individuals who discuss "noble ideals" in a very soulful but vague and incoherent way. This type of teacher has a great deal to say about the "still small voice of conscience," about inspiration, about the functioning of the "inner soul." Some of them seem to get results and in those rare cases should be left alone to achieve these results in the peculiar manner they have. The majority of such people are, however, just muddled. They do not know what they are talking about and cannot make any specific, concrete, definite statements indicating that they do. They are much annoyed by requests to describe more exactly the ideals they are teaching, to tell exactly how the teaching begets the ideals, and how they know the learners are really acquiring the ideal and accompanying response. While ideals cannot be measured as can addition and spelling, nevertheless teachers must discuss the psychology of emotion in an intelligent way and be able to make clear just how they are applying it in their work. If they cannot do this they had better use their time in other fields.

As indicated elsewhere, it is sometimes necessary to explain directly and explicitly what is wanted, and this brings the matter into the uncertain realm of moralizing, "pointing the moral." Little is known. Certainly direct pointing of the moral has been in disrepute. On the other hand, ideas of what is right can be apprehended if properly taught, and these ideas do affect conduct in many instances. The ideas are at least stimuli. Interest in doing the right can be aroused in the same way that interest in problem solving can be aroused.

Further evidence of the efficacy of direct statement of control is to be found in the various codes in existence. Their efficiency varies, of course, but they have undoubtedly been of service. The Ten Commandments and the Oath of Hippocrates may be cited as illustrations of effective codes.

To be sure, all do not abide by the rules. If the Rotarians actually did put "service before self" we could none of us recognize the business world. But if they talk about it long enough, surround the idea with enough approval, an emotional urge will begin to effect it and carry it over into action. Besides, many do abide by rules and codes. They are at least standards and stimulations.

We hear of individuals who "mean well," whose "intentions are good." These people want to be good, to do the right, but do not know how. [Some, of course, suffer from volitional deficiency.] Their ideals and standards are vague, indefinite, not explicit. Charters cites the case of an office force who desired to leave the office neat and orderly at the close of work, but who were unable to do so until a definite plan for the arrangement of materials and apparatus had been worked out.

5. *Lessons should be informal.* Whether the attack is incidental or direct and explicit, the actual conduct of the learning period should probably be informal in the main. The best technique is probably an informal, natural, conversational discussion. There should be just enough analysis when necessary to identify the situation and feel the meaning. Occasional questions may aid, or a call for questions from the class. The aim is to cause feeling to well up and attach itself to ideas, processes, beliefs. There should be vivid descriptions or narrations given with feeling, for emotion is contagious. Students may be asked to select passages they like but need not be asked to tell why they like them. Students who will not be inhibited may be given opportunity to read with feeling selections of their own choosing. Appropriate action often begets the emotion. There should be striking concrete illustrations. Downing tells of a boy about to throw a rock into a pool. "How old do you think that rock is?" asked the teacher. "I don't know; how old is it?" It was a piece of quartzite

from the Archean beds in Wisconsin. "About five hundred million years old." . . . "Gee," and the rock went into the boy's pocket. For just a moment he had a glimpse of things other than the simple and the obvious. His feeling of awe and wonder was boyish but none the less real. The cynic may say that the boy will soon take the rock out of his pocket and lose it or throw it away. Quite so. But he cannot lose or throw away the emotional reaction he had. One reaction counts for but little, but many such will do more for the boy than listening to much pious maundering about "nature and nature's God." Waples describes a similar illustration in which a twelfth-grade class was introduced to Burns's *The Cotter's Saturday Night.* The teacher stated impressively that in Scotland the poem was considered sacred and was read almost with the respect accorded the Bible. Certain expressions in the poem were explained in order that thought might not be interrupted during the reading. The poem was then read with feeling to the class. No further comment was offered either by teacher or class. Attempts to be "informational," to discuss or emphasize the feeling aroused by the poem would spoil it. Another discussion quoted by Waples, too long to repeat here, is to be found in Benson's *David Blaize,* and should be read if available.

Obviously, the more direct the attack the less informal the lesson can be. Effort should be made, however, to evolve devices which will focus attention on the emotional element rather than on information or judgment. Dramatization is one of the best procedures known.

6. *Individual differences must be respected.* Ideals and standards are and should be much the same for all individuals of the same social group. Modes of acquiring them may, however, differ widely with individuals. It will be recalled that emotional reaction is erratic, uncertain. The stimulus which appeals to one learner may leave his

neighbor cold. Lessons successful with one group may be unsuccessful, or arouse opposite reactions from those desired, with another group. There must be variety in method and versatility in the teacher.

7. *Do not attempt to measure or test, in the traditional manner.* The meeting of the National Education Association at Indianapolis in 1897, during which Rice presented his findings on the measurement of teaching efficiency in spelling, has become classic. His proposal to evaluate teaching by measuring precisely the performance of the pupil was greeted with ridicule verging on abuse. The discussion strayed from the measurement of precise things, as spelling and arithmetic. A sentimentalist decrying the idea of measuring human reactions thundered at Rice, "How would you measure, Sir, a mother's love for her babe?" Without hesitation, Rice replied, "I'd estimate a mother's love, Sir, by seeing if the baby's face was clean, if it was bathed and attended to properly, if it was fed regularly and with good food, if it was put to sleep at the proper hour and not kept up while the mother went to a dance." Here we have the clue to determining the nature and strength of emotional standards. We cannot measure precisely. We must watch and note if action is in accord with a desired ideal or standard. The term "trait action" has been evolved to mean those objective, observable acts which are presumptive or symptomatic evidence of the possession of an ideal, belief, or standard. The actual estimation of a learner's progress in this type of learning will thus be a lengthy process. As a matter of fact, it is a continuous process. It will involve patience and watchful waiting. We may look for incidents which embody illustrations of the desired reaction, or we can use codes, or lists of desired reactions as a check list. The latter both supply the standard and aid in seeing and recognizing the evidence.

The following incident illustrates the type of thing that supplies evidence for judging one's possession of emotional standards. A supervisor entered a room in which a boy was seated studying at the side of the teacher's desk. Seeing the visitor, the boy blushed and glanced toward the teacher in evident embarrassment. He was seated where misbehaving pupils were usually placed. The teacher grasped the situation, smiled at the boy, explained in a sentence that his desk was being repaired and that he was studying at her desk temporarily. It would have been easy to leave the boy in his false position. Many teachers would not even have noticed that he was in such position. Many otherwise kindly adults would not have thought it of enough moment to explain. This teacher possessed true courtesy and tact. The situation tested her. Her action was ample evidence.

The members of a certain home room were noted to be avoiding disorder not only in their own room but in other rooms. They studied or went about their work quietly while others made mischief or took advantage of the teacher's absence. The situation tested them. Their actions indicated the possession not only of excellent work habits, but of a genuine respect and liking for good behavior.

Evidences of appreciation are to be found when pupils hum or sing the tunes they have been given in class; when they note, of their own accord, a tasteful arrangement of color; when they begin to reject lithographs and cheap prints for better pictures; when they begin to discriminate between poor jokes and stories, and good ones, etc.

A device which is both a learning exercise and a test is to ask students, particularly on the upper levels, to work out lists of trait actions to go with certain standards, ideals, tastes. Another is to ask them to watch for incidents furnishing concrete evidence, as in the illustrations above.

Hughes[15] illustrates a general listing of trait actions in terms of which specific incidents can be searched for:

CONFIDENCE IN OWN ABILITY

Lowest Rank	*Highest Rank*
1. Avoids responsibilities	1. Courts responsibilities
2. Expresses no ambition for worth while achievement	2. Expresses ambition for worth while achievement
3. Hesitates about expressing own opinions	3. Does not hesitate about expressing own opinions
4. Is pessimistic when confronted with difficult tasks	4. Attacks difficult tasks resolutely
5. Mistrusts own judgments Is timid	5. Relies on own judgment

Many schools are attempting to develop report cards on which pupils' progress in controlling conduct may be indicated to parents. This is a much more difficult task than reporting progress in spelling or drawing. The cards, in their beginnings at present, are of great importance. They necessitate the analysis of ideals into characteristic symptoms; they are learning devices; they are standards of evaluation. A sample page[16] from the card in use at Horace Mann School, Columbia University, is given:

2. *In Relation to Others and the Belongings of Others*

J. *Is courteous* ..... (45)

Allows older persons, or pupils in front of him, to pass through doorways or into the elevator first	4
Opens doors for others	3
Offers book to a guest	3
Picks up something dropped by another	3

[15] H. W. Hughes, "A Rating Scale for Individual Capacities, Attitudes, and Interests," *Journal of Educational Method,* Vol. 3, October, 1923, pp. 60-61. Quoted also in Monroe, *Directing Learning in the High School,* p. 320.

[16] Upton and Chassell, "A Scale for Measuring Habits of Good Citizenship," *Teachers College Record,* Vol. 20, January, 1919, pp. 36-65.

Waits quietly in turn for some privilege, as sharpening a pencil, etc. 4
Is pleasant in greeting and uses a person's name when addressing him 4
Avoids abruptness of speech, as "sure," "yep," "say," etc. 3
Laughs or talks quietly, that he may not disturb others 4
Is quiet and mannerly at lunch 4
Is attentive when some one else is talking whether it be another pupil, a teacher, a visitor, or a speaker in a public place 6
Is reverent in attitude during prayer 7

The school is handicapped in controlling conduct. Three serious difficulties stand in the way of setting up ideals and standards through the school. *First,* the American school system is open to all. This gives the teacher huge numbers to deal with in heterogeneous groups. It is impossible to teach all to read and write with equal facility. How much more impossible then to develop the subtle and erratic emotional reactions. In the *second* place, the school has control for but a relatively short time. The home, the street, the playground, the gang, all exert their influence. Often they work at cross purposes to the school. The standards of the school do not always have the approval of the home or the street. In the *third* place, the school in self-defense devotes its time to developing utilitarian, measurable outcomes. The public demands accuracy in spelling and arithmetic. These results can be measured. The public does not demand so urgently or explicitly honesty, sympathy, human understanding. It seems more important to be able to add and multiply one's money than to feel pride or shame over the methods of acquiring the money. Or does it?

The place of punishment in training behavior. Time was when punishment of misbehavior was the chief force relied upon to develop good behavior. Discipline as a school

problem has steadily decreased in importance as teacher training has improved. The better type of teacher personality available plus better classroom method has made the maintenance of good order a minor routine problem. Punishment has become steadily rarer, and the whole question has lost its importance in the field of moral training.

Is punishment ever effective in building good habits? Recalling the facts concerning concomitant learning, and concerning satisfaction and annoyance, certain general conclusions may be drawn. At first glance, it would seem that punishment, being attended by annoyance, would be effective in stamping out undesirable habits. However, the annoyance is apt in many cases to be attached, not to the act, but to the agent of punishment, or to the "getting found out." There seems to be a tendency with certain writers to stress this possibility, annoyance attaching to the wrong thing, concomitants of a very undesirable type accompanying punishment. This is hardly fair, as everyday observation of children will show. In many cases, with many temperaments, the annoyance is attached to the undesirable act and does aid in stamping it out. However, it is undoubtedly safest to avoid punishment as a means except as a last resort in serious cases. When the offense is clear, especially when it is deliberate, when the whole group recognizes the situation, when "getting away with it" is imminent, there should be authoritative interference from above. But emphasis must be placed on the use of this as a *last resort*. Furthermore, the offense should be handled as one against the group rather than as against the teacher or school. If class work is properly socialized, most instances of bad behavior will actually be interferences with the other students rather than with the teacher. The displeasure and censure of the group is much more effective than that of the teacher. The refusal or

reluctance of one's mates to allow participation is, with most normal individuals, the most effective punishment available. Under such conditions, punishment is a legitimate and valuable instrument in training conduct. Good routine management of the classroom, excellent teaching procedure, the proper type of personality, will reduce this, as stated above, to a minor duty of class management. As such, the problem will not be treated in detail here, discussions being available in books on class management and discipline.

Supplementary Assignment

In view of the importance of the problem and the tentative nature of all discussions, it is urged that students be required to read at least one, and preferably two of the following references. Numbers 1, 2, 3, and 5 are the most important.

1. Charters, W. W., *The Teaching of Ideals* (Macmillan Co., 1925).
2. Kilpatrick, W. H., *Foundations of Method* (Macmillan Co., 1925), Chs. xix, xx.
3. Parker, S. C., *Types of Elementary Teaching and Learning* (Ginn & Co., 1923), Ch. xv. Excellent concrete discussion.
4. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. x. Seems confused in organization, but contains much good concrete material.
5. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Ch. xxi. Exceptionally valuable.
6. Thorndike, E. L., *Principles of Teaching* (A. G. Seiler, 1906), Chs. xi, xii, particularly the former.

Discussion Questions for Summarizing and Testing on Section 2

The first question can be made the basis for an hour's vigorous discussion if several students are asked to present one or more illustrations under each rule. The question is designed to focus attention on the specific matters of technique.

1. For each of the seven rules given in this section, be prepared to describe in detail one illustration of good procedure and

one of poor procedure. Take examples from your own high-school and college experience.

2. Relate (if you can without embarrassment) an actual case from your own experience or observation in which learning of this type was successfully accomplished. The illustration may deal with a standard of taste, of beauty, of truth, or with moral action. Analyze it as carefully as you can, trying to make clear the factors which seemed to accomplish the desired result.

3. A common school punishment is to make students learn by heart so many lines of inspirational or enjoyable poetry. Critically evaluate this procedure.

4. What are some of the incidental and direct means you might use to develop pride in a clean and orderly room with a second grade, a sixth grade, an eleventh-grade class in a physics laboratory?

5. Educational institutions fail rather signally to establish certain reactions of social and moral nature in the learner. But oddly enough on the college level the learner acquires many such responses easily and firmly. The student body is the educational institution in this case. Analyze this rather typical situation and attempt to discover the factors which make for failure and success.

6. A teacher who had been attempting to inculcate health habits wished to test the success of her efforts and set the following question for written discussion, "Do you think that it is a good thing to follow the basic rules of hygienic living?" Critically evaluate this procedure.

7. Two teachers are confronted with the same problem, namely, that of teaching the ideal of honesty. One teacher explains what honesty is, tells the children that they should be honest and gives several reasons for the acquisition of this virtue. Another tries to give the ideal by presenting specific cases of honesty, giving the advantages, benefits, etc., in a more or less indirect manner. Which is the better teaching? Give the reason for your choice.

8. A group of twelve-year-old girls from good homes, well trained, were remarkably untidy with their personal belongings and living quarters at boarding school. The house mother tried in vain to get them to clean their rooms and keep them neat. One day a group of girls of the same age from another part of the school was expected to visit this dormitory to plan a project in which both groups were interested. The house mother was

astonished to find her girls busy straightening their rooms and making them as neat as possible. What is the guidance for teaching to be derived from this incident?

9. As far as you can tell from your present knowledge, what is the *chief* difference between learning to be courteous and learning to ride a bicycle? The chief likeness?

10. A pupil cheats on examinations and is not concerned about it, but at the same time rigidly refrains from cheating in games on the playground. Why probably does he behave so differently in the two situations? What is the problem of the school? What guidance for the teacher?

11. What probably is the basic reason why individuals do not do right, are not tidy, are not courteous, even though they know quite well that they should be?

12. A scout master had occasion to reprimand his troop very severely for creating disturbance, causing property damage, and in general conducting themselves in an improper manner during his absence. The meeting was then called to order and scout after scout stood at attention and repeated the scout creed, "The scout is trustworthy, loyal, helpful, friendly, courteous, kind, obedient, etc." The ring-leader in the previous disturbance was one of the best in snappy, accurate rendition of the creed.

a. What probable errors in teaching evidently preceded this situation?
b. What is the reason for having the scouts repeat this formula?
c. What suggestions might be made tending toward real learning in the situation?

13. On the other hand, many rough and careless boys join a scout troop and do evidently acquire genuine habits of trustworthiness, courtesy, helpfulness, etc.

a. What correct teaching procedures were probably utilized here?

Section 3: Developing Habits of Enjoyment

Exploratory and Pre-Test Questions

1. The great mass of people spend their leisure time playing bridge, dancing, attending moving pictures.

a. What really is the item on which enjoyment usually hinges?
b. Critically evaluate the worth of the enjoyment.

[You will doubtless have to analyze your own reactions here.

The item of enjoyment will differ with individuals and with the same individual at different times, of course.]

2. People enjoy a sermon, a radio concert, a piano recital, a detective story, a movie, a summer day, a swim, a football game.

a. Ask a few of your friends to select something that each particularly enjoys. Ask them to try to tell you specifically why they enjoy it or what they enjoy.

3. Classical concerts are patronized largely by music students, experts, "high brows." Art institutes are not utilized by any large percentage of the population.

a. Why do people not turn to these forms of enjoyment in larger numbers?
b. Should we attempt to train more to do so? Could we train all?

4. Very often dogs will howl and babies cry when listening to minor music. Why do you suppose this is true?

5. To most people, the combination of red and pink is unpleasant. Why?

6. The "Anvil Chorus" from *Il Trovatore* is widely known and generally liked. Among authorities in music, Bach's *Fugues* are highly thought of. Unless one is rather well trained, however, he is not likely to enjoy the latter. Vastly greater numbers of people enjoy the former.

a. According to the supposedly divine principles of democracy does this not mean that the "Anvil Chorus" is superior music to the *Fugues?*
b. Does it not bear out the popular dictum that critics are usually wrong?
c. What guidance for teaching?

7. Many times one laughs simply because the rest of the group laugh. The enthusiasm of children at a circus is often imparted to the elder who accompanies them. One may go to a party in a dull mood and come home happy and enthusiastic.

a. Explain in simple terms. What guidance for teaching?

8. Two individuals find themselves with an evening unexpectedly free. One looks forward to a tedious evening of boredom, the other looks with pleasure toward the opportunities of free time. Explain briefly the differences existing between the two.

9. A certain instructor of literature made a great hit with his students. They were enthusiastic and evidently enjoyed the work immensely. Before the end of the term, however, they were as listless and bored as ever. Several explanations can be advanced.

10. An art teacher went in for copying beautiful pictures, drawing from beautiful but abstract models, etc. Her supervisor asked the purpose and was told "appreciation of the beautiful." The students were listless and indifferent. When asked how this work developed appreciation of the beautiful, the teacher replied in surprise, "Why, it can't help but develop it." She was hurt and angry when asked to be more specific or to utilize work more interesting to the students.

a. Was the supervisor justified?

As stated earlier, it is desirable to develop legitimate habits of enjoyment either (1) just for fun, or (2) for the beneficial effect on the individual or group, or (3) as a worthy use of leisure—a substitute for idleness or vicious pleasure. Contrary to the uncertainty existing about the other type of emotional learning, here there is no doubt. The opportunities for training in enjoyment in school are numerous and obvious. Neither must there be reliance on incidental teaching, though many habits of enjoyment will develop incidentally. Human nature is so constituted that it is most willing and eager to learn methods of enjoyment. There is no antagonism toward suggesting methods of enjoyment as against indicating emotional reactions toward right and truth, "pointing the moral." Some object, to be sure, to "supervised play," stating that the term itself is impossible and indicates an impossible situation. Play is characteristically free, say these people; to supervise it ruins it as play. Such arguments are a waste of time. Only if the emphasis is on "supervised" rather than on "play" is the contention of value. Under present urban, industrial life, training in play and enjoyment is one of the most obvious and urgent needs of children and adults

alike. Direct attack may be made. Utilizing the ordinary laws of learning, interest, motive, and habit formation the school proceeds to develop the desired outcomes.

Incidental teaching. As stated above, the individual is so constituted that he will enjoy himself if opportunity is but presented. The principle of varied learning response is sufficient here. We may be sure that enjoyment will be a concomitant of many activities which are carried on for more utilitarian purposes.

Direct teaching. Despite the ease with which enjoyment is engendered, it must be made a matter of conscious concern and deliberate planning on many occasions. Without deliberately planned contacts many individuals would never know anything about many worth while pleasures, would never develop habits of enjoying them. What principles will be of assistance in directing enjoyment?

1. *The learner must be interested and prepared.* The general principles of motivation and apperception have been discussed sufficiently elsewhere. Certain specific applications will be discussed briefly here.

For interesting a group in good reading, Parker suggests three devices: (1) the continued story device, (2) contagion devices, and (3) appealing to individual interests. In the first, the teacher does as the popular magazine does, reads a story aloud up to a thrilling moment—then suggests that the pupils may read the rest themselves. Contagion of emotional states is easy. Labeling a book a "best seller" often makes it so. If the teacher or some pupils demonstrate real enjoyment of certain pieces of literature, many others will read to see, and some of them are bound to derive enjoyment. This leads to the third point, appealing to individual interests. All will not enjoy the same things. Knowledge of interests already possessed by the various pupils will enable the teacher to direct individuals to subjects which will fit in with habits of enjoyment already

acquired. Obviously, the second and third devices are not confined to literature but may be used in all other fields productive of enjoyment.

In a very clever address, Scott [17] not only satirizes the usual treatment of the classics but indicates in general the way to develop interest among high-school students. He says, as if speaking directly to the students:

> The classes of former years have been reading this prescribed set of books—a pretty poor sort of literature, in my opinion, and not proper for young people to read. You are fortunate in being able to get rid of them. They are mostly very dull and uninteresting. There is the *Iliad,* for example, full of fighting and blood and the killing of men, and of armies clashing with one another in desperate conflicts where all the elementary and violent human passions are set free. Horrible! The International Peace Society cannot approve of anything of the sort. We will put this book aside, and I hope none of you will touch it. Then there is the *Faërie Queene,* all about giants and maidens in distress, magic and mystery of all sorts—perfectly useless, a futile, silly thing, nearly as bad as the *Arabian Nights.* Don't go near it. I trust, also, that no one will attempt to read *As You Like It,* which has a wrestling match in the very beginning (these minor athletics ought not to be allowed in literature) and tells about a girl who ran off into the forest in a boy's dress—a most improper performance on her part. I am sure we ought not to talk about those things in this class. And even worse, perhaps, is Tennyson's *Princess,* where a prince who ought to know better disguises himself in woman's clothing and gains admission to a girls' academy. A scandalous thing! No gentleman would act in that way. In short, these books are harmful and ought to be destroyed. For the present I will put them on the top shelf of the closet here, and just as soon as the janitor is at liberty we will have them burned.

Teachers of subjects other than literature can make equally clever applications of the doctrine of interest.

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[17] F. N. Scott, "Discussion of High School English Uninfluenced by College Entrance Requirements." *Proceedings of the North Central Association of Colleges and Secondary Schools,* 1912, pp. 67-72.

What Hayward calls "anticipatory interest" is important in any learning but doubly so in emotional learning. It may be developed casually and incidentally by dropping hints and general remarks from time to time in connection with other things. It may be developed by good introductory discussions.

Lack of understanding not only prohibits thought but sometimes enjoyment as well. Obsolete words and phrases, idiomatic expressions, anything that interrupts the flow of thought and pleasure, spoils the enjoyment. It is well to explain such difficulties in advance, despite the objections of some extremists. Even the opera prepares the audience by including in the overture most of the melodies which are to appear later. The story is told of a traveler in New England who came upon an epitaph containing a most difficult verse from Browning. He could neither understand it, nor enjoy its significance. Commenting on it to a villager, he received the reply, "None of us hereabouts could make head nor tail of it, till the schoolmaster grammafied it for us. Now we like it fine."

On the other hand, there is no necessary and inevitable connection between understanding and enjoyment. The analytic treatment of literature, art, or music is legitimate when understanding of theme or technique is the aim. Sometimes analysis of thought is necessary for enjoyment, but many people can enjoy some things quite as well without intellectual understanding. In fact, the enjoyment of most people in fields of art and music is probably not based on understanding. Some authors insist that understanding will increase and improve the enjoyment. This is doubtless true for many people, but distinctly not so for all. It is even entirely possible that understanding may spoil or quite destroy enjoyment. Enjoyment of many things in literature or art rests on illusion. Intellectual understanding may destroy the illusion and spoil the enjoyment.

Knowing too much about the technique of music or dramatic art may entirely spoil the enjoyment of performances which would be highly enjoyable for those who were not so well informed.

While an aim in the formal sense would doubtless detract from an enjoyment lesson, there must be an understanding of what the lesson is about if it is to escape incoherence and maudlin wandering. The very literature itself which is to be enjoyed, often states its "aim" at the beginning, "arma virumque cano," arms and the man I sing!

2. *The teacher must genuinely enjoy the pleasure she seeks for the learner.* No teacher can stimulate enjoyment of things she herself does not enjoy. A teacher who lacks the flexible, playful, fun element in her make-up cannot successfully teach such lessons. The enjoyment must be real. No amount of pretending or false enthusiasm will deceive the pupils, except possibly a small minority. The saddest sight on a playground is the teacher of the "school ma'am" type attempting to play with her pupils. Occasionally a rule is promulgated by a superintendent requiring teachers to participate in the play activities of the school, and to teach such games and sports as will develop habits of enjoyment. The results with a few teachers are pathetic. On the other hand, the teacher who will throw herself into games and sports can stimulate real enjoyment, incidentally teaching much of fair play and sportsmanship.

The teacher who is cold and harsh can never stimulate her class to an enjoyment of poetry or pictures that express tender emotion, kindness, or sympathy. Her class well knows her life to be so organized that these emotions do not enter to any extent.

Parker advises against "puritanism," believing that the teacher who thinks fun is reprehensible, plays and games a waste of time, cannot sympathetically or successfully train pupils along recreational lines.

3. *Avoid gushing, insincere statements, attempts to force the enjoyment.* Neither false enthusiasm nor gushing will bring real enjoyment. It is always bad technique to say, "That was very enjoyable, don't you think so?" "You enjoyed that very much, didn't you?" "Isn't that just too beautiful?" In a popular novel there is a schoolroom scene in which an old-maid teacher of the story-book type is attempting to teach kindness, sympathy, and love by means of a poem about little birds in a nest. She gushes about love and affection over the line "Little birds in their nests agree." A little country girl speaks up from the wealth of her experience and asserts, "But they don't, they fight like everything." The teacher raps the child smartly across the knuckles with a ruler for making this accurate contribution to the lesson and then wonders why the class does not appreciate the beauties of nature!

As noted in the previous section, there are some teachers who discuss ideals in high-sounding but meaningless language. So also with enjoyment, there is the soulful individual and the sentimentalist who have much to say about "spiritual" enjoyments that are, in fact, quite beyond the comprehension of ordinary students. Children enjoy beating the other fellow, "I got there first," "Tag, you're it." They enjoy loud noises, laughter, jumping about, being in a group of active happy mates. They probably do not enjoy, "subtle insights into the nature of things," "glimpses of a far-off land of happiness." They do not understand, let alone enjoy contemplation of the infinite—it would probably frighten them badly if they understood it! It is better to know as exactly as possible what we are talking about, to describe as concisely as possible the enjoyments at which we aim. High-sounding, abstract, or insincere statements all lead to confusion.

4. *Provide opportunity for the exercise of the desired enjoyment, so that habits may be acquired.* The immense

amount of time and money given to golf, tennis, swimming, etc., to organized sports, indicates the ability and desire of the average individual to play for enjoyment. The necessary skills and attitudes can be engendered through a school program of games and athletics. The program should invite participation by all, replacing the limited, semi-professional procedure with which many high schools and colleges are educationally handicapped to-day. Improperly handled athletics are prime sources of unsportsmanlike habits, low standards, many vices opposite to the virtues supposedly derived. Improperly handled interscholastic contests do not make for friendliness between institutions and groups but for the direct opposite. Properly handled athletics are not only one of the best possible sources of enjoyment but also of ideals and standards.

Dancing is closely related to the active form of enjoyment to be derived from sports and games. Properly taught, it is an excellent source of both exercise and enjoyment. In communities opposed to it, dancing should probably not be included in the program.

The crowded theater and moving-picture palace indicate another avenue of enjoyment. The school can afford excellent opportunities for participation in dramatics. In addition, it can inculcate proper standards of enjoyment in those who are to enjoy, not as participants, but as audience or optience. Similarly with music, habits of participating either in production or listening may be developed. Reading of adventure, romance, colorful description, mystery, is a form of enjoyment open to all in which the school has probably its greatest opportunity.

With higher levels of intelligence, pleasurable contemplation of beauty in art and in nature may be set up as an aim. Rousseau long ago commended the beauties of natural scenery as valuable material in stirring the emotions.

Those who participate in the motor activities listed above

may get their enjoyment out of (1) the struggle of the game, (2) legitimate pride in their own expert performance, (3) being part of an efficient group, (4) being one of a group of good fellows, (5) the physical activity itself. Those who derive enjoyment from watching games, from reading, listening to music or the drama, contemplating pictures or nature may derive their enjoyment from (1) sensory stimulation—rhythm, color, rapid expert motion, (2) the technical skill of the athlete, actor, writer, or painter, (3) enjoyable trains of thought, day dreams, reveries, happy memories stimulated by the ideas of author or artist, (4) pseudo-emotional responses.

5. *Avoid analytic treatment.* In the past, too much emphasis on the intellectual side of these lessons has killed the spirit they were attempting to arouse. Too much analysis, too much attention to nonessential detail, too much emphasis on rigid and dogmatic form are fatal to the emotional glow of interest and enjoyment. Such formalism is to be scrupulously avoided. Much indifference and active antagonism to good literature was acquired in school as surely as ability to multiply was acquired there. The school emphasized intellectual ends and developed appropriate techniques long before emotional outcomes became prominent. The natural but disastrous error was made of importing the analytic methods of the producer and the problem solver into the realm of the play boy. We are not concerned here with understanding literature, music, etc., nor with training in the technique of production. The aim is enjoyment, one of the types noted in the preceding pages. The technique must be different. A clever satire on prevalent techniques is to be found in the address of Scott: [18]

> And now we are going to take up some books which I know you will enjoy. I want you to be just as enthusiastic as you can about them, for we are going to study them and study them

[18] *Ibid.*

hard, and you will get a great deal of profit out of them, and all will be greatly improved. For the boys we will take Captain Mayne Reid's *Afloat in the Forest*. We are going to read that book a paragraph at a time and examine carefully every allusion in it. It is about some people who floated down the river Amazon. First we will draw a map of South America, locating the course of the river, and then we will ascertain how wide the Amazon is at various points and how fast the current moves. Finally we will determine the amount of silt which is deposited by the river at its mouth. Captain Mayne Reid, by the way, makes a mistake. He has three people float down in a much shorter time than they possibly could. You will see that this is so when we discover the exact relationship between the flow of the stream and their rate of progress. We shall go into details with the utmost care, and after a little while you will write some nice little essays about them.

For the benefit of the girls, we will read in the same careful and scholarly way, Robert Chambers' *Heart Throbs of a Multimillionaire*. We will determine just how many times the heart throbs when two hearts are in unison, and learn about the two kinds of blood corpuscles, and so on, and there will be essays on all these things also.

But this is not all. Two years from now when you are seniors, we will take these books up again and go over them and over them and over them until you know the answers to every last question in regard to all these mathematical, biological, chemical, and topographical things, and that will be absolutely delightful.

An excellent contrast is found in the presentation by two different teachers of the same poem. Waples's account of the introduction of *The Cotter's Saturday Night* will be recalled. Brief reference was made to the place of the poem in the hearts of Scottish people, the poem was read with appropriate feeling. If the proper feeling welled up for the auditors—good. If not, analysis would not have brought it. Monroe tells of a teacher presenting the same poem who asked fifty questions in ten minutes about the first thirty-five lines! What emotional concomitant, if any, is likely to be aroused? We are not concerned here with grammar,

structure, related information, skill in production. Analysis is not the method. It may be noted in passing that enjoyment material may be utilized for information, for problem solving, for memorization if desired, but in another lesson. Sometimes intellectual discussion of this material will precede, sometimes follow presentation for enjoyment.

Much is to be said here for the Lange-James theory of emotions—that appropriate acts beget the emotion. In attempting to arouse the proper enjoyment to go with literature or art the teacher may ask herself how the attitude desired causes one to act. Reproducing these acts may beget the emotion. The proper reading of poetry, playing of music, the proper tone in singing, all tend to motivate the appropriate emotion in the listener. Vivid, concrete illustrations are valuable. Red-letter days, reserving some material for special occasions, is a worthy device. Other suggestions were made under Rule 5 in the preceding section.

There may and should be much natural free discussion of what one likes and does not like. This should remain on the level of citation and support, and never reach the level of argument.

6. *Individual differences must be respected.* An ancient proverb has it, "De gustibus non disputandum est," which being freely translated after the present mode means, "There is no accounting for tastes." I have a friend who enjoys nothing so much as driving down Michigan Boulevard in Chicago at the evening rush hour. He does it often, thoroughly enjoying the crowd, the lights, the traffic jams, the bustle and confusion. He evidently likes his enjoyments where there is safety in numbers. My own enjoyment is keenest where straight eights, plus fours, rush-hour mobs, and the hole-in-one pest have never appeared. I go to Michigan Boulevard with my friend only when business makes it unavoidable; he has never been induced

to come with me to the wilds of western Oregon where there are fewer people per square mile than to the square block in Chicago. Which is the higher form of enjoyment, mingling with the bustling, battling crowds or sitting on the sand dunes watching the waves crash upon the beach? Neither of us can say—at least not in the presence of the other!

Some individuals enjoy the theater and the moving pictures, some one but not the other, some neither. Some people thoroughly enjoy the highest type of poetry that bores their friends to tears. These same people may enjoy the wildest kind of improbable mystery stories, their friends also. Many teachers having acquired the technique, evidently enjoy sincerely the type of analysis of literature decried in the preceding paragraphs, but most people do not. It is always dangerous to recommend one's own enjoyments to another, an educational crime to attempt coercion.

In no phase of learning is the choice of the learner so supreme. The guidance for the school is plain. Ample and varied opportunities should be included in the program, open to all students. Temperaments, past experiences, the myriad factors making up emotional choice, will determine which enjoyments are selected.

One caution here. Let us avoid futile philosophical arguments attempting to distinguish between "harmless" and "beneficent" enjoyment. The distinction between desirable enjoyment and mere time-killing pastimes, circular reactions, and between those and enjoyment attended by distinctly detrimental effects, is quite clear to sensible people. Those who wish to quibble over who are the sensible people may be left with their arguments.

7. *Do not attempt to measure or test in the traditional manner.* If prose is merely to be read without analysis, if poems are merely to be read without much comment, if

contemplation is to be a recognized method, how can one be sure that any learning has taken place? The traditional teacher relying on quizzes, examinations, "papers," holds up her hands in holy horror. As a matter of fact, one cannot be sure that habits of enjoyment are being acquired, particularly during the supposed learning period. Worse than that, there is little one can do about it. However, this is not as serious as it sounds, except to the traditionalist. Some check can be made and that without interfering with enjoyment.

In the first place, if materials are properly chosen and presented, in terms of the nature of the learner, it is very likely that they will be used. Some results are inevitable. In the second place, as indicated in the preceding paragraphs, informal discussion is bound to result if the subject is really interesting and challenging to the learner. Students will make comments and evaluations. These can be utilized to start informal, frank, and unaffected discussions by means of which the skillful teacher can bring out the things to be enjoyed and out of which enjoyment is constructed. As stated elsewhere, this will not be analytic discussion, nor will it often be concerned with technique. Neither must argument assume a large place. This is much harder than teaching analytically with annotated editions locating all the similes, metaphors, allusions, etc., on which to "test" the learner. So much skill is required with the newer method that we will probably continue to assassinate students' enjoyment of the classics for some time to come, using the analytic method. However, with teachers who know the psychology of the learner as well as the birthplaces of all the authors, there is hope that such informal discussions will assume a large place, particularly in high school and college. Such discussions are both learning and, if it is necessary to have such, "testing" devices.

For teachers who desire to avoid "snap courses," to secure

courses the tests for which make students "work," "study," "grind," no advice can be given. To dig and grind is not the technique by which enjoyment is attained ordinarily, though properly interpreted these processes may be very valuable in acquiring a motor skill or in learning how to solve problems.

Fear on the part of teachers of literature, music, and art that their courses be designated as "easy" or "snaps" is in part legitimate, in view of the academic traditions under which they operate. The æsthetic subjects from which enjoyment and appreciation can be gained should stand boldly upon their own peculiar contribution as a worthy one. They should boldly claim that their peculiar technique of teaching and absence of traditional testing is entirely legitimate. Teachers of these subjects should not strive to "teach pupils to think," as if getting into the intellectual classification justified the existence of the subject. Pupils can be taught to think much more easily and effectively elsewhere. The æsthetic subjects have their own peculiar contribution to make and should be duly proud of it. What is necessary is a new view of education, one in which enjoyment figures as a legitimate end and the new techniques of teaching as legitimate procedures.

As suggested under Rule 7 in the preceding section, evidence of emotional acquisition can be secured by observing the behavior of the learners. Evidence of the acquisition of habits of enjoyment is to be seen when students hum and whistle tunes they have learned in school, when they voluntarily read and recommend to others the type of books they meet in school, when they use out of school the games learned on the playground, when they voluntarily seek opportunities to observe good pictures, the beauties of nature, when they voluntarily and without affectation comment upon the beauty of autumn leaves, a flower bed, a stately tree, etc.

Discussion Questions for Summarizing and Testing on Section 3

The first question may be broken up and distributed among several students, and several reports on each point may be given.

1. For each of the seven rules given in this section, be prepared to describe in some detail one illustration of good procedure and one of poor procedure. Take examples from your own high-school and college experience as students.

2. Two teachers observed that their pupils got little fun out of recess, usually standing by the door waiting for the bell or wandering around the yard. It was agreed that the two would take turns encouraging and teaching games during the period. The first teacher explained a game and told the pupils to start playing it, punishing those who held back or would not play. The second teacher, when her turn came, ran out calling, "Every one that wants to have a lot of fun, come with me and I will show you how to play Prisoner's Base" (or whatever game she had in mind). Analyze and evaluate.

3. In a certain city a well equipped playground is little used but the neighborhood streets are full of children playing. What is the probable explanation?

4. A student writing a paper describing some of his high-school experiences used this sentence, "Our literature teacher dragged wearily into the room, slumped wearily into her chair, languidly opened her book, dragged slowly through the lesson, heaved a sigh of relief and dragged wearily from the room." Can you tell what he said next about his "enjoyment" of literature?

5. Four people are looking at Millet's *Man with a Hoe*. All are enjoying it, but let us assume that each gets a different enjoyment. What various elements might furnish the different enjoyments?

6. The umpire, a sports writer, an ordinary spectator, and a player all expressed thorough enjoyment after a certain exciting baseball game. Obviously their parts in the game differed widely, they did not see it from the same angle. What different enjoyments might the various individuals have derived from the game? Any guidance for teaching?

7. A high-school student had read several of Cooper's stories on the outside as supplementary material for his history course.

He enjoyed them immensely and looked forward with pleasure when he saw *The Spy* listed for study in the literature class.

After studying it, he expressed wonder that one and the same writer could have written such interesting tales as those he read for history and such a deadly boring and impossible book as *The Spy*.

a. What other explanation is more likely true than his diagnosis?

8. Another student describing her high-school experiences said, "We loved to have this teacher read poetry to us—you could just see the things the poem told about, and feel the way the people must have felt in the poem. We certainly did like poetry."

a. What factors in the teacher's procedure probably accounted for this?

Observation Exercise for Section 3

Teacher Activity

1. Does the material being taught make a more or less universal appeal? Is it adapted to the enjoyment capacities of the class? Does the teacher note individual differences? [They are usually more marked in enjoyment lessons than in other types.]

2. Does the teacher prepare the class to understand by preceding the lesson when necessary by a discussion of the thought?

3. Does the teacher avoid technical analysis? Avoid emphasis on details not essential to enjoyment?

4. Does she strive for a genuine feeling response? Avoid, however, trying to force expression of it by questions such as, "Don't you enjoy this?" or "Is this not beautiful?" Does she stimulate free spontaneous expression of employment? Allow experimentation with the process involved?

5. Does she avoid vague, incoherent discussion and statements in regard to worth and beauty?

6. Does she really enjoy it herself? Avoid hypocritical remarks in regard to desired effect?

7. Does she plan and administer the lesson carefully? Is she definite and purposeful?

8. Does she make any attempt to use in real life the feelings aroused? Does she draw her original material from real life?

Pupil Activity

1. Do the expressions and attitudes of all, or a majority of the pupils indicate real enjoyment? Passive attention? Positive dislike?

2. Do they ask such questions as seem to further the understanding which is necessary to some types of enjoyment?

3. Do they manifest free, spontaneous expression of enjoyment? Do they clap their hands? Ask for repetitions of old favorites among the stories, poems, songs, etc.?

4. Do they try to repeat or use the things they see and hear? Sing or hum tunes? Play or dramatize stories?

5. Do they refrain from high-flown phrases in regard to worth and beauty and other terms which they obviously do not understand?

6. Do they avoid those affected expressions of emotion which are obviously to please the teacher? Do they occasionally state honestly that they do not enjoy the presentation?

Parallel Readings for Section 3

1. Foster, H. H., *Principles of Teaching in Secondary Schools* (Charles Scribner's Sons, 1921), Ch. ix.
2. Grant, J. R., *Acquiring Skill in Teaching* (Silver, Burdett & Co., 1922), pp. 167-170. Contains an exceptionally good list of true-false statements which may be used as a summary discussion.
3. Hayward, F. H., *The Lesson in Appreciation* (Macmillan Co., 1915). Seems to be the only thorough-going treatment in print. Has an excellent bibliography. The best single reference.
4. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Chs. xviii, xix, xx.
5. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. x. Very good on high-school level.
6. ———, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923), Ch. xiv. Excellent on elementary level.
7. Scott, F. N., "Discussion of High School English Uninfluenced by College Entrance Requirements." *Proceedings of the North Central Association of Colleges and Secondary Schools,* 1912, pp. 67-72.
8. Waples, Douglas, *Procedures in High School Teaching* (Macmillan Co., 1924), Ch. xiii.
9. Wilson, H. B., Kyte, G. C., and Lull, H. G., *Modern Methods of Teaching* (Silver, Burdett & Co., 1924), Ch. ix.

Discussion Questions Involving Both Types of Emotional Response

The following questions are of interest and may be used to stimulate further discussion on the material covered in the foregoing sections of Problem 5. Both types of response are involved to greater or less degree in each question.

1. A boy reading tales of Richard the Lion Heart, shouted out spontaneously during the reading hour, "Gee, wasn't Richard a peach of a guy."

a. Do you suppose that any real learning was taking place? If not, why do you think not? If so, specifically what learnings might be taking place?
b. Would it matter much if the boy could not tell the years when Richard lived, the dates of his Crusades, the size of his army?
c. Can we be satisfied with such reaction as he did make and forego factual testing?

2. Many people deplore the use of children's classics in primers and beginning readers, because the originals are chopped up into short sentences and otherwise adapted to the interests and background of the age level involved. There is a good deal to be said on both sides of the question, further qualified by the objective in mind. This is an interesting and important question and analysis should be carried to some length. Summarize arguments and attempt to come to a conclusion.

3. A first-grade teacher secured the best children's picture books she could purchase and placed them on the book table. Exercises to acquaint the children with the books were given. Soon the pupils came to school early to look at the books individually without interruption, particularly as new ones were added.

a. Is this mere enjoyment, time-killing, which takes the pupils away from more worth while occupations?
b. Are any other learnings possibly taking place?

4. Many adults enjoy the "funnies" and comic strips in newspapers, reading them eagerly and with manifestations of evident pleasure. In the light of your reading, what do you think of the place and value of this material?

5. A second-grade class in "music appreciation" was introduced during one unit of the work to the following list:

Hymn to the Sun.....Rimsky-Korsakov
Prelude to the Deluge.....Saint-Saëns
Dance of the Hours.....Leoncavallo
Dance of the Flowers ..... Tschaikowsky
Prelude in E Minor.....Beethoven

a. Judging from the list what specifically was evidently the teacher's aim?
b. Is there any guidance for teaching in this?
c. What suggestions would you make, differentiating aims first? [If you do not know music, omit this question.]

6. A high-school English teacher follows this method in general: asks students to read short paragraphs in turn from the classic being studied, errors are corrected, allusions and figures of speech discussed. At some stage of the presentation she discusses the life and background of the author. Papers are written from time to time. The students are not much interested and state that they dislike the stories. The class happens to be on *The Last of the Mohicans,* when the teacher hears a speaker say that if pupils are not getting lots of fun and enjoyment out of this very story something is wrong. Her class is not and she is not sure that they should. Meeting the speaker later she states her disagreement with his remarks and adds that if enjoyment is the aim we might as well give the students *Spicy Confessions* or *Dead-Eye Dick.*

Work out a sympathetic discussion to give this teacher. Be prepared to talk from three to ten minutes.

7. Two men viewing the country from a train comment as follows: The first man, "Great country, isn't it? Look at those Jersey herds. Creameries everywhere." The second man: "Look at the wonderful display of wild flowers; the cattle do not thrill me. There is more hope for humanity in a wild flower than in tons of beef and butter."

a. This incident can be related variously to several points discussed in the foregoing pages. Show the relation to as many as you can.
b. Is there any guidance for teaching in this?

8. Cousinet says there are two aspects of æsthetic education, production (execution), and contemplation (appreciation).

a. Is this a valuable and valid distinction or not?
b. Any guidance for teaching?

9. The teacher of a high-school English class studying Shakespeare had the students dramatize certain scenes. They made armor out of silvered cardboard, twisted string for chain mail, used sheets and white gowns for togas.

a. List possible emotional learnings strengthened or initiated.
b. Evaluate the general procedure critically.

10. The range of material usually listed for a year's work in "literature" covers an immense range of subject, geographic setting, historical period, style of writing, etc. Is this a desirable and advantageous feature or otherwise?

PROBLEM 6

ARE VARIABLE STATEMENTS OF LEARNING TYPES LEGITIMATE?

Exploratory and Pre-Test Questions

None. Proceed to study of text.

A young American student of pedagogy in a German university taught a lesson of his own organization toward the end of one of his courses. This was a required exercise, observed by several critics and discussed afterwards. As the student entered the discussion room after the lesson, the head teacher said in English and in kindly manner, "Ach, Herr ———, you wish to know of your lesson? We are sorry but it was a — ah — a catastrophe! Yes, a catastrophe. You took a rich piece of deductive material and attempted to teach it by formal inductive methods."

Teachers must know the *basic learning types,* their objectives and processes in detail. Knowing them only as names and as formulas, erroneous application is made. Without a coherent theory of learning and teaching, the teacher is a trade worker applying "tricks of the trade." To be sure, teachers must know the tricks (devices), but if they are to be more than blind routine workers teachers must also have an understanding grasp of *fundamental principles.*

Merely to enumerate the types of learning as a system of classification would be of some value but terminology is a minor matter. To insist on one's own organization of types would be conceited, arbitrary, illustrative of the very error to be avoided, namely, failure to understand basic principles. The learning types can be distinguished from each other,

and each has its own objectives, processes, and an appropriate teaching technique to accompany it. There are innumerable devices by means of which these techniques may be carried on. The originality and initiative of the teacher will vary actual procedure infinitely, but *basic principles* are the criteria of procedure. Grasp of them is essential to the professional teacher. Without such understanding of principle, we have teachers stimulating pupils to "think" when the objective is really the acquisition of arbitrary, fixed, factual material; dealing analytically with pure enjoyment material; memorizing things that should be discussed for thought content. Literally, scores of such blunders can be observed daily. Few things cause as much waste as misapplication of teaching procedures. Objectives are not achieved, and worse, the learner is confused, muddled, discouraged, and given no glimpse of rational organizations.

What then are the *basic learning types*, the valid teaching techniques? How may we know that a published account is one of sound principle or merely a collection of routines, formulas, trade tricks? There are any number of texts on the market devoted to the teacher's method. They differ widely in terminology and organization. The wide variation in terminology has contributed much to the confusion in teacher's thinking and practice. More important, the lack of sound organization has unquestionably contributed to the average teacher's lack of a coherent and logical view of learning and teaching. Is there, however, legitimate variation in terminology and presentation of learning types and accompanying "methods"? Perhaps a brief survey of the basic necessities in a sound organization, and a comparison of various statements may aid in giving the teacher a better understanding of the fundamental nature of teaching and learning. Ability to recognize the few basic types under various terminologies should do much to clear up

the widespread incoherence in ordinary discussion and practice.

Essentials of a sound organization. Essential features are two, first a basic determining principle and criterion of organization, and second that this principle be capable of logically subsuming under it details of learning and teaching activity. Obviously books containing a hodge-podge of chapters on motivation, questioning, problem solving, induction, drill, self-activity, laboratory methods, review, the recitation, individual differences, and developmental lessons have no fundamental basis of organization. The contents may be sound and valuable in a limited way, but the student derives no coherent view of learning and is being trained in unrelated minutiæ. These books give trade rather than professional training.

The learning types in this volume. The preface of this volume states that the nature of the pupil's learning process is the core of organization. Learning is defined, in general, as the acquisition of responses. In ordinary discussion the exact reference is not always clear. Learning may refer to the type of response acquired, or to the process of acquiring it. Some confusion results from failure to distinguish between learning as product and learning as process. It is well to remember that learning may be discussed in terms either of the type of response, the objective, or as method of acquisition.

Psychologists' analyses of learning reveal two things; first that there are a number of characteristics common to any and all learning processes, and second that there are a number of fairly distinct types of response and corresponding methods of acquiring responses. The number of types and terminology for them differs somewhat with psychologists, but this is usually a matter of interpretation. There is agreement in general. For our purposes five methods of acquiring responses are accepted. These are (1) *sensori-*

motor, resulting in motor skills, (2) *perceptual,* resulting in a stock of ideas of things and processes, (3) *memorizing,* resulting in the acquisition of arbitrary associations, formulas, etc., (4) *problem solving,* resulting in various mental skills, concepts, and general ideas, (5) *emotional,* resulting in (*a*) ideals, sentiments, attitudes, and (*b*) habits of enjoyment. After the general character of learning has been presented, the five types are elaborated with appropriate teaching techniques built around them. Finally, subsidiary learning activities and general teaching activities are described and related to the basic types. The system is, it is hoped, internally logical and coherent. Effort has been made to cover all general principles and procedures, and to relate them to the basic core—the nature of the learning process.

Morrison's types of teaching. In presenting his organization of types, Morrison [1] says:

> In the theory which we here advocate, we make large use of the principle that all real learning, except the learning of skills, is in the form of adaptations in the individual. Nevertheless, a workable theory of teaching must take into account the fact that the psychology of the learning process, the nature of the essential objectives sought, and consequently the teaching process itself, all differ in important details as we go from one subject to another in the secondary school. We can, however, group all the subjects taught in the field of general education, and indeed in the field of vocational education so long as it is taught on the secondary level, into five different types, which characteristically differ among themselves in the nature of their objectives and in the psychology of the learning process.

That is, Morrison starts with the learning process and the desired responses (adaptations), much as in the present volume. Believing as he does, that there is a very close relationship between the psychological learning types and certain types of subject matter, he lists his types in terms

[1] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), pp. 89 *ff.*

of the subject-matter groups. This gives five, (1) the science type, (2) appreciation type, (3) practical-arts type, (4) language-arts type, and (5) pure practice type. He relates these subject types to the learning processes and results by pointing out that the science type requires reflection and rationalization as its processes, and results in understanding; the appreciation type involves affective processes, resulting in sentiments, attitudes, and appreciations; the practical arts involve self-activity, trial, and error, imitation with reflection incidental and results in practical skills and understandings. The language-arts type involves several objectives and several learning processes, including perception, memorizing, expression, and imitation. Pure practice involves repetition and memory, and results in the acquisition of arbitrary associations and some skills.

Kilpatrick's types of purposeful activity. After discussing the necessity for unifying a number of related aspects of the educative process, Kilpatrick [2] says:

> I began to hope for some concept which might serve this end. . . . Such a concept must emphasize the factor of action . . . at the same time provide a place for the adequate utilization of the laws of learning, and no less for the essential elements of the ethical qualities of conduct . . . the last (factor) involving the social situation as well as the individual attitude . . . include also the generalization that education is life. . . .
>
> As the desired unification lay specifically in the field of method, might not some typical unit of concrete procedure supply the need—some unit of conduct that should be, as it were, a sample of life, a fair sample of the worthy life and consequently of education? As these questionings rose more definitely to mind, there came increasingly a belief—corroborated on many sides—that the unifying idea I sought was to be found in the conception

[2] W. H. Kilpatrick, "The Project Method," Teachers College Bulletin, Tenth Series, No. 3, Oct. 12, 1918, p. 3. *See also* his *Foundations of Method,* Ch. xxi.

of whole-hearted purposeful activity proceeding in a social environment, or more briefly, in the unit element of such activity, the hearty purposeful act.

Here again learning is the basis of organization. Learning proceeds through a series of purposeful acts. Various types of purposeful acts may be distinguished in terms of the purposes and processes involved. Four types are designated, (1) the Producers Project,[3] (2) the Consumers Project, (3) the Problem Project, (4) the Drill or Specific Learning Project. As can be inferred, the Producers Project involves making something, utilizing trial and error, manipulation, imitation and individual problem solving. The Consumers Project involves the enjoyment of something. The third and fourth types are self-explanatory.

Freeman's learning types. In his book, *How Children Learn*,[4] Freeman discusses the growth of the child's mind, showing how good instruction on all levels must be founded on certain general principles of the psychology of learning. Though admitting devices as necessary training material, he stresses the much more important point that the teacher must possess basic general principles and be able to apply them in some measure. He stresses also the obvious fact that failure to apply in the past has been largely due to the poor type of psychology generally dispensed in teacher-training institutions.

Freeman organizes his learning procedures into four types, (1) acquiring skill, (2) building up perceptions,

[3] Disregard, for the moment, use of the word *project*. As stated elsewhere, use of the word here is questionable. As Kilpatrick himself says, "It is indeed possible that some other term as *purposeful act*, for example, would call attention to a more important element in the concept, and if so might prove superior to the word *project*." We are here concerned with the logical organization of learning types. Differences in terminology should not blind us to the soundness of the general scheme proposed by Kilpatrick.

[4] F. N. Freeman, *How Children Learn* (Houghton Mifflin Co., 1917).

(3) association and memorizing, (4) problem solving or thinking.

Similarity of these organizations. For a thorough and intelligent understanding of the three latter discussions, study would have to be made of the volumes in which details are set forth. For our purposes here, it is sufficient to point out that all these organizations are based upon some fundamental core around which learning and teaching details are arranged. Furthermore, the careful student can recognize behind the various terminologies distinctly similar concepts. [See Exercise No. 1.]

Other variations of "method" principles. The foregoing illustrations and a few others that could be given, indicate clearly that there are several legitimate ways of organizing and stating the facts relating to teaching—the direction of learning. It is indicated with equal clarity, however, that the *basic learning types* are relatively few and that it is the terminologies which differ, not the basic principles. At this point, we may refer again to the fact that there are many texts in existence which are not presentations of coherent theories of teaching but collections of tricks of the trade, rule of thumb procedures. There is no organization of devices, "methods," and tricks under a system of principles. Courtesy forbids illustration of this type of presentation by direct reference. [See Exercise No. 2.]

What, then, becomes of the vast number of "methods" familiar to American teachers? Who has not heard of the *type* method, the *developmental* method, the *heuristic* method, the *lecture* method, the *direct* method, *socialized* methods, *object* method, *supervised study* method, not to mention those methods of fleeting fame designated by the name of the pedagogue who evolved them, and which flash across the pedagogical horizon from time to time?

Many of these terms refer to legitimate and valuable teaching devices. The teacher possessing a logical grasp

of principle can analyze these stray "methods" and place them in proper relation to the logical system. More important than classifying, she can use them intelligently and to the best advantage.

The old terms *inductive method* and *deductive method* were first dropped by Parker for reasons already set forth in this volume. The names as they stood were misleading. Most later writers have followed Parker's example. The developmental method, to take another illustration, refers to the skillful use of questions by means of which the teacher develops material from the learner. It is a device in technique and furthers problem solving and perceptual learning. It can be used in other types as well. Socialized methods refer to devices motivating and insuring better participation in discussion on the part of the pupil. They are devices stimulating the gathering and comparing of data, the making of group decisions, etc. So-called visual methods, so prominent at present, refer merely to the use of visual aids, moving pictures, still pictures, museums, charts, specimens, etc., as aids in teaching. They will usually function in problem solving, perceptual and emotional learning, less often in sensori-motor. [See Exercise No. 3.]

Most of these, then, are names for devices, or more pretentious organizations by means of which the functioning of basic principles is furthered. They usually refer to a piece of, or emphasize parts of basic principles. Some one discovers a good way of motivating, or directing some phase of learning, and straightway it becomes a *method.* It is probable that *technique* is a better term than method. The word *method* can be and has been used to refer to anything that the teacher does. It also has its more technical meaning of basic principle. Because of loose usage, it is probably better to avoid use of the term except where it clearly refers to broad general principles based directly

upon the method of learning. *Technique* legitimately refers to and includes anything the teacher may do.

In conclusion, we may repeat, that the value of any attempt to reduce the incoherent terminology of teaching method to a system, is not for the sake of the system. The danger in thinking of the many devices as separate and distinct methods is that the teacher becomes submerged in specifics, in a number of isolated and formalized types of teaching and loses sight of the basic underlying psychological principles of learning. A compact logical system not only makes for ease and clarity of discussion, but should contribute to clarity of understanding.

Questions for Testing and Summarizing on Problem 6

1. Point out explicitly the fundamental similarity existing between the items in the four organizations used as illustrations in this problem.

2. Select from the library any text on "general methods," "principles of teaching," "how to teach," etc.

   a. Examine the preface to discover if a fundamental organization is set forth.
   b. Failing to find it in the preface, look for it in an introductory chapter or at some point where it may logically appear in the book.
   c. Failing to find it anywhere explicitly set forth, examine the table of contents and individual chapter summaries to discover whether the author has a principle of organization even though he fails to state it.
   d. If he states his principle in preface or introduction examine the book to discover if he maintains it logically throughout the volume.
   e. If he has no principle either stated or evident through examination of content, show clearly how and where he is incoherent.

3. From experience, conversation with teachers, or from texts, find as many *methods* as you can. Attempt to fit them into some logical system such as illustrated in this problem or such as you can devise. Examine the *method* carefully and see what it really does, then relate it to fundamental principles. One or two illustrations will be ample.

Parallel Readings for Problem 6

1. Burton, W. H., *Supervision and the Improvement of Teaching* (D. Appleton & Co., 1922), Ch. xi. An early attempt to organize. Out of date now, but useful in supplementing the present discussion.
2. Kilpatrick, W. H., "The Project Method," Teachers College Bulletin, Tenth Series, No. 3, October 12, 1918.
3. ———, *Foundations of Method* (Macmillan Co., 1926).
4. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926).

UNIT IV

THE PUPIL'S SUBSIDIARY LEARNING ACTIVITIES

Learning takes place through the exercise by the learner of the skills and procedures inherent in the learning types as presented in Unit III. Learning is furthered, however, by the exercise of certain accessory processes, such as practicing, studying, reading, etc. These are, of course, intimately related to the basic learning types; in fact, they usually consist of some item of the learning process elaborated and emphasized for special purposes. These important fragments of the learning process possess a technique of their own. Five of them are presented in this unit: studying, reading, expressing, using the laboratory, and practicing. The first four are related more closely perhaps to problem solving, the last to memorizing and sensorimotor learning. The first three are closely interrelated.

In discussing these subsidiary processes, we approach in some cases the domain of special-method courses in various subjects. Hence the following summaries are confined strictly to general principles and procedures, leaving special details for later special-method departments.

PROBLEM 1

HOW MAY EFFECTIVE, ECONOMICAL DRILL BE SECURED?

Exploratory and Pre-Test Questions

1. What is the educational implication of the old maxim, "Practice makes perfect"? Could practice ever make imperfect?

2. Supposing that you were asked to repeat forty times the mirror drawing experiment which you did while discussing sensori-motor learning, what results might you obtain?

a. Might any improvement be noticeable?
b. Specifically, what kinds of improvement? (Go back to your original experiment.)
c. How do you account for this improvement?
d. List any other factors which might be involved besides practice.

3. A small boy who played "hookey" constantly, was discovered to be sneaking back into school in the afternoons for a certain reading period. Some of this work was rather ordinary drill work and word study. What reasons can you advance for his return to the fold?

4. Many people make excellent progress at first in learning to play golf or tennis, in learning to swim, etc. Then comes a period in which they seem utterly unable to improve at all. What probable explanations can you advance? How remedy the situation?

5. A boy given to poor grammatical usage was kept in to write 150 times, the expression "I have gone." The teacher hoped to cure him of saying, "I have went." He finished his task and then wrote at the bottom of the sheet, "I have finished and I have went home." Explanation? Guidance for teaching?

6. I recently visited a lower grade during an arithmetic period, and the pupils were playing hop scotch or tossing bean bags at a board with holes in it. What could this have had to do with teaching arithmetic?

7. Spelling matches used to be popular. Perhaps you participated in some. What are the values for learning? The weaknesses? Could they be administered so as to be very valuable?

8. Many teachers put long lists of arithmetic problems on the board, or dictate them to the class. They do the same with grammar exercises, and factual questions in geography and history. Pupils copy the questions and answer them, thus getting drill and practice. What are the advantages and disadvantages of this procedure?

9. You have doubtless used some books in which the notes were at the back; others in which the notes were at the bottom of the pages. Which is the better practice and why?

10. Which do you think would be better procedure, and why: to practice on the piano one two-hour period per day; two one-hour periods per day; or three periods of two-thirds of an hour? There are arguments for each alternative; present them and decide as well as you can. Is your final answer anything more than personal preference and guesswork? Could this question be settled some other way?

11. A youngster reported at home that he studied the *guzintas* at school to-day. His parents professed ignorance and he explained, "Oh, don't you know about the guzintas? Two guzinta four two times, two guzinta six three times and like that." What mistakes did this teacher make which you should avoid?

12. If a pupil achieves what is known as a *standard score* for his age and grade, and works hard to go even further, he is quite likely to fall back even below his normal score. Why do you suppose this is true? What guidance for teaching?

13. I visited a room recently in which the teacher was using a number of prepared sheets with drill problems upon them, that she had bought in quantities. All the pupils were required to do was to write in the answers. Was this a device to get out of work or was it a legitimate procedure? Support your answer.

14. Show how the initial careful study of a poem, a piano selection, or some other unit, might involve quite a different procedure from that involved in studying it later for purposes of retention.

15. When school opens in September, many teachers complain that the pupils must have been very poorly taught last year, since they do not know even simple fundamentals. What is the probable basis for this situation?

Several of the lesson types discussed in the previous unit are practically always followed by periods of practice or drill in which the associations are repeated over and over again until they are permanent and automatic. As is quite obvious, the drill process, by its very nature, is prone to become monotonous, dull, and distasteful. Some teachers even believe that it is not good drill unless it is "hard" for the pupil. Since it is principally unavoidable repetition, they say that the pupil had better learn to do this thing, distasteful though it may be, with the best possible grace. Some of them argue, further, that the learning is more efficient, and that moral benefits accrue in forcing one's self through the dull, uninteresting task. The latter point is now an exploded theory, and in regard to the first point there is much experimental evidence to the contrary.

Some of these experimental results have been combined with James's famous laws of habit formation, by different authors who have formulated principles for the conduct of drill lessons. The majority of authors have held rather closely to James's laws, which are the classic pronouncement in the field. Excellent though they are, they have for some time needed elaboration and addition. Such a treatment, making these laws more specific and exact, and adding much from recent experiments, will be found in Chapter X of Parker's *General Methods of Teaching in Elementary Schools,* or in Chapter VIII of the same author's text on high-school method. The first reference seems to be the most practical and explicit discussion available for the elementary teacher, the latter for the high-school teacher. The present discussion of drill is based largely upon it, and acknowledgment of indebtedness to Professor Parker's publications is made.

Obviously, the drill lessons will not have sequential steps, as have the lessons discussed previously. They are concerned with but one thing—the repetition of the same ma-

terial over and over again. The teacher's task is to secure as many correct repetitions as possible, accompanied by the highest degree of attention and interest that can be maintained. To enable her to do this, the following principles based upon Parker are laid down:

1. A correct start followed by correct practice must be insured. Speed should be subordinated to accuracy.
2. Zeal, interest, and concentration of attention must be secured and maintained.
3. Feelings of satisfaction and dissatisfaction must be considered, as they vitally condition the results of a drill lesson.
4. Avoid wastes of time on accessory and nonessential processes. Drill must be on the association or skill involved.
5. The facts drilled on in games and devices must be applied in real situations.
6. The drill periods should be short and distributed over a considerable length of time.
7. Learn under some pressure.
8. Use ready-made drill systems.
9. In memorization there should be an analysis of the thought content first. Correct recall should be the principal method used; the *whole* instead of the *part* method.

What are the procedures on the part of the teacher that will indicate her mastery, or ignorance, of these principles?

A correct start followed by correct practice; speed subordinated to accuracy. The old rule "practice makes perfect" needs some analysis and change before acceptance; practice can as easily make imperfect if the wrong thing is practiced. Every precaution must be taken to see that all have exactly in mind what is to be accomplished. One or two of the brighter pupils may be called upon to state for the class what is to be done, and others from the slower group may be asked to repeat. Devices such as having the girls make the explanation, or the boys, or the different rows—all have for their purpose the making clear of the procedure to be followed. Finally a few check questions should be asked to insure a correct start for all.

The danger of incorrect practice is well illustrated by the case of the teacher whose class could patter off the little rhymes in the primer and first reader, but had no real understanding of the words. A supervisor cut the pages in one reader so that the picture of *Little Red Riding Hood* came above the words relating to *Little Boy Blue* and vice versa. One of the glib readers was then given the book, and she repeated word for word the selection about *Little Boy Blue,* though she was, as a matter of fact, looking at the words concerning *Little Red Riding Hood.* This teacher's work was poor in word drill. The children had quickly memorized the oral model and were not reading off the page at all, though they were experts at pretending. Such an example is extreme, of course, but there is great danger in lower grades that, through incorrect practice, children will learn to patter off a series of words or string of numbers, and not really be gaining the knowledge or power desired. On the college level, we have many students who can rattle off formulæ, but who cannot apply them.

With motor skills there will often be an astonishing lack of comprehension of what is to be done, even when the movement is demonstrated and worked out in detail. After a teacher has stood directly in front of a class and made lines with a crayon *across* the page, calling attention to the direction and motion, some are sure to draw lines up and down or round and round. Much material will be wasted in drawing, sewing, and manual training, or injury will result in gymnastics or athletics, if the pupil does not clearly understand the object before he starts. This matter is emphasized, of course, during the original learning (setting the model), but must be reëmphasized at the beginning of drill periods.

This matter of making clear what is to be done, and getting a correct start, is related to the second part of the main principle, the subordination of speed to accuracy. It

is usually a great temptation to start work before making sure that every single pupil is ready, but impatience must be restrained. There is also danger in adapting the pace to the very quick members of the class, thus dragging the slow pupils over the ground at a rate incompatible with accuracy. The discussion of individual differences applies here and should be reread.

Speed must be emphasized, but not until sufficient accuracy has been attained to give the pupil confidence. Courtis [1] says on this subject:

> The surest sign of faulty use of the practice tests is the speed which is due to excessive effort and nervous strain. The speed that is desired is the perfection of execution produced by thoroughness of preparation. The speed that is merely hurry makes for exhaustion. Do not force speed. Inspire conscientious practice and the question of speed will take care of itself.

In regard to writing, Freeman [2] says:

> The speed of writing should be low at the beginning and should gradually increase. . . . Pupils should maintain a balance between attainment in form and speed, so as not to develop one quality to an extreme degree at the expense of the other.

Gray [3] points out in regard to reading that:

> The rapid readers usually read more effectively than slow readers . . . but for a given pupil the comprehension of what is read decreases as the rate of reading increases above his normal rate.

Evidence on this point is not unanimous, however, since Monroe [4] states in regard to arithmetic:

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[1] S. A. Courtis, *Teacher's Manual for Arithmetic Tests* (World Book Co., 1914), p. 4.

[2] National Society for the Study of Education, *Eighteenth Yearbook,* 1919, Part II, p. 15.

[3] *Ibid.,* p. 42.

[4] *Ibid.,* p. 89.

In the operations in arithmetic emphasis should be placed upon rapid work rather than upon accuracy. . . . Of course accuracy should not be neglected. Tell pupils to be accurate but do not suggest that increased accuracy is to be secured by working more slowly. The greater emphasis should be placed upon the rate of work. There are doubtless exceptions and there is a limit beyond which this relation does not hold.

A good summary of this first principle of drill that points many practical applications is found in Earhart: [5]

It is most desirable that teachers who consciously train pupils in habit information should take pains to see that the first associations are correct, and that the first acts are those which are to be fixed by drill. The position for writing, the manner of holding the pen, the forms of the letters, the forms of figures, the order of letters in words, the utterance of sounds in phonic drill, the tones used in singing and reading, reading connectedly instead of in a choppy, word-at-a-time fashion, the pronunciation of new words, the number combinations, and the many other details which should become automatic, are all matters which should be started in the right way. To say, "Never mind for the present. That matter will take care of itself by and by"; or, "when the pupils are old enough to know better, they will do differently" is to disregard the force of habits when once they are formed, and the probability of their continuing as they are begun. It is safer far to begin with the correct habit and thus make sure of it. . . . When the correct habits have once been started, it is often necessary to consider how they may be made to operate quickly.

As indicated in the discussion of memorization (Problem 3, Unit III), the first impression one gains is very powerful. If a wrong idea of what is to be drilled upon is gained from first contacts, it is most difficult to break down. False association should be guarded against and effort made to discover if any are present.

Zeal, interest, and concentration of attention must be secured and maintained. The old story about the boy who

[5] L. B. Earhart, *Types of Teaching* (Houghton Mifflin Co., 1915), p. 167.

was kept after school to write upon the board "I have gone" 150 times, and who concluded with a note to his teacher, "I have went home," illustrates the result of drill without interest and attention. Despite the opinions of a few teachers who believe that interest cannot be aroused for drill lessons, it can and should be secured. Ordinarily it is better to drill a few times with a high degree of interest than to drill a great number of times with little or no interest. The same problem is presented here that has been discussed before; there must be an appeal to instinctive interests or a realization of the intrinsic worth of the subject matter. An aim may or may not be stated, but when a snappy interesting aim can be devised, it aids greatly in focusing attention and arousing curiosity.

An unlimited number of games and devices that have for their purpose the arousing and maintaining of interest during drill periods, have been worked out by teachers through the years. Primary number work and reading afford almost continuous opportunity for the use of such games, with which teachers should familiarize themselves. They may be found in such texts as Parker, in magazines dealing with method, or they may be obtained from other teachers. The young teacher should acquire a store of them in different subjects. As an example, the simple game of naming the leaves on a tree drawn on the blackboard might be cited. Attention can be held several minutes on pronouncing the words written on the leaves, each correct one counting a score for the pupil. Sometimes real leaves can be given with which to keep score. Having one child think of a word, and the others guess it by pronouncing, is another device in word drill. Any number of counting games and types of spelling matches can be devised. Flash cards not only hold attention but are very economical of time. These few examples are cited merely as illustrations; a whole volume would be necessary to recount all that are in use.

Flash cards are used effectively on the high-school and college level, as are also competitive games. It is as necessary to use interest-getting devices there as on the lower levels. Interest here, of course, can be secured by more rational appeals than on the lower levels.

The game or device should be changed as often as circumstances seem to demand as, for instance, when interest flags or begins to be focused elsewhere. When the period is so short as to admit of but one game per period, new ones should be used each time for several days. Sometimes the children will manifest a liking for some of the games, and a helpful device is to allow them to choose the one they wish. The teacher must be careful not to confuse these devices with method, or to allow them to become more important than the process being drilled.

Feelings of satisfaction and dissatisfaction must be considered. Responses accompanied by satisfaction tend to be repeated and stamped in, while responses accompanied by dissatisfaction tend to be avoided and lost. This may seem to some teachers and supervisors to be a part of the preceding principle. The matter of interest and the matter of satisfaction are closely related, likewise flagging attention and dissatisfaction. If this were all, the two points would be the same and no separate principle would be necessary. However, children can be intensely interested and still be dissatisfied. On the other hand, one of the teacher's bugbears is the child who is quite satisfied and happy, but who is neither paying attention nor doing any learning.

The first group of children, those who are interested and trying their best but who are dissatisfied and unhappy, suffer a real handicap in their learning. Slow children can often suffer a great deal of humiliation with disastrous results to their work when brought into competition with brighter ones. Administrative or teaching devices to bring children of corresponding intelligence level or special-ability

level into competition with each other should be worked out and applied. The skillful distribution of assignments, so that each may accomplish something and feel the satisfaction of achievement, will help. Another good device is to train the individuals to compete with their own records. In the case of the pupil who is satisfied and happy but doing nothing, there should be an examination to see if he is mentally normal. In most cases he will be, and the case is really a disciplinary one. Either at home or in previous grades he has been allowed to loiter, to evade, and to shirk. Every attempt should be made to enlist his attention and effort and to cure his attitude of complacence. Failing these means, he must be dealt with in such manner as to force him to participate and do his share. Such a case is complicated, of course, by the workings of the very principles here discussed. His forced work will be attended by feelings of dislike and dissatisfaction which will make his coöperation poor and his work slow. However, persistence will probably arouse a latent pride, an interest in competition, or a real liking for doing well.

Avoid waste of time on accessory and nonessential processes. Probably every one remembers from grade-school days, the laborious copying of problems from the board preparatory to working them. In manual training, drawing, nature study, etc., it often took more of the period to get the materials and put the tools in shape than was left for the actual work. In language, long paragraphs and sentences were copied for purposes of correction. Probably there are grown men whose fingers will ache as they recall the endless copying of words missed in spelling, or the rewriting of compositions because the margin was a sixteenth of an inch too wide, or because the commas got mixed up with the semicolons. All of this was looked upon as a necessary part of the school procedure until recently but is, as a matter of fact, an atrocious waste of time.

Another example of wasted time is found in drilling on an error that is not present, or upon a skill that is fairly well perfected by all of the class. Many young normal graduates have excellent plans for the elimination of common errors in language, or for teaching some motor skill, and they apply these plans to classes that have never heard of the error or who will have no possible use for the skill involved.

In many drill games there must be considerable passing back and forth by the children. This should be routinized and speeded up so that undue time is not given to it.

One of the most intelligent devices in this matter of concentrating drill upon the real processes, is the use of flash cards. Practically every teacher has made a few, or purchased some, for one subject or another. The limits of the teacher's ingenuity and originality are the limits of what can be done in this field. In one or two subjects, there are excellent ready-made systems of drill cards on the market which have been worked out by experts, and are based upon a long period of experimentation. A good summary of sources of this material will be found on page 267 of Parker's *General Methods of Teaching in Elementary Schools.*

Certain teachers object to flash cards as giving isolated drill, as not approximating the use of the material in real situations. There is, of course, a theoretical danger here that is probably real in some cases. On the other hand, with students of normal intelligence drilling on associations and skills of relative simplicity, the carry-over is made. Experimental evidence is not yet conclusive, but there is much to show that flash-card drill is valuable when properly used.

The facts drilled upon in games and devices must be applied to and used in real situations. Children are often frightened by real situations that call for skills and associa-

tions that have been drilled on in class, in isolation. Children can be drilled until they are letter perfect in such things and still be unable to use them coherently. They are sometimes unable to recognize situations that involve them. This point is illustrated by the story told in the pre-test questions of the child who came home and told his parents, "We had the *guzintas* at school to-day." There was no thought that the *guzintas* were for any other use. Some children can spell words well in columns but miss them when writing sentences; others recognize words in word drill very well, but do not read them well in the book. In arithmetic the point is doubly important because of the many formal skills and combinations involved. Much of the shift in emphasis from formal grammar toward language work is a result of recognizing the difficulty here discussed.

Teachers should provide clothed problems and supplementary exercises that involve the application of skills and associations learned elsewhere. Many opportunities for such applications can be found in regular problem-solving lessons or in the making of generalizations. Drill itself can sometimes be carried on by means of clothed problems, provided they are short enough to allow for repetition, which is essential in drill.

In an effort to make school processes identical with real life, there is often a foolish attempt to have used in school none but real problems from the community about the pupil. Far-fetched applications are made to the measurement of bins in the new barn, to fields that are to be fenced or seeded. The gable angles of new houses, and the shingling of the kitchen roof, are also made to supply "real" problems in mensuration. Wherever problems in which the answer is really serviceable to some one can be used, it is unquestionably a good device. Failing a great supply of them, and that will be the case in most instances, the

teacher can and must provide drill problems of her own or take them from other books. The proper use and construction of such auxiliary problems will guarantee a reasonable degree of transfer to the problems that will be met in real life. Problems that call for computations and results that are in no way useful or connected with possible situations should be ruled out.

Drill periods should be short and distributed over a considerable length of time. Twenty-five years ago, drill periods in practically all subjects were of long duration. This is the case even yet in some schools. If a pupil did not do well, the period was lengthened. This latter device seemed to be practically the only reaction teachers made to poor drill work. The beginnings of change appeared when Superintendent Rice created a furor by presenting figures showing that children drilled ten minutes a day did as well in spelling as children drilled forty minutes a day. His findings were greeted with ridicule and abuse, but there has been a steady shift of opinion, until now there is a vast mass of experimental data supporting the theory of short, intensive drill periods. It should be noted in passing, that while the majority of experiments favor this theory, there are some important studies that seem to contradict it. Individual differences also enter in and condition the workings of the idea:

> For any one habit in any one person there is some one best distribution of time over the series. For one habit or set of habits it may be best to give ten drills of twenty minutes for the first week, ten drills of ten minutes the second week, ten drills of five minutes the third week, five drills of eight minutes the fourth week, and one drill of ten minutes a month for four months. Or it may be best to distribute the 460 minutes in a very different way.[6]

[6] From E. L. Thorndike, *Education* (1912), Ch. ix, p. 173. By permission of The Macmillan Company, publishers.

In the lower grades experiments tend to show that from five to ten minutes is the best period, and this can be gradually increased in the upper grades. In the lower grades, again, the periods will probably be more frequent—in some cases two or three a day. The higher the interest, the longer the period can run. This, in fact, should be the teacher's guide in large measure; when interest flags there should be a change of game or device. After one or two such changes, attention will flag somewhat despite the new game, and a halt should be called. The danger of catering to whim and indifference of certain individuals in the class, instead of a genuine flagging of interest, must be guarded against.

As more and more power is gained, the interval between drills can be lengthened. Drill should not end abruptly, but taper off with tests at intervals to determine the amount of retention. These tests may take the form of clothed problems or of standardized formulas for the purpose. Practically all the systems of ready-made drills, discussed above, have with them standard scores for age and grade, together with standardized tests for determining the pupils' standing in relation to these norms. The theory is, that when the pupil reaches a certain norm, drill is for him no longer necessary. As fast as pupils reach this score they should be excused from drill and given other tasks. These may be drills in other subjects in which they are not up to par, or outside reading in a content subject, or manual work. Much time is wasted and bad behavior invited by retaining a pupil in a drill class after he has attained proficiency. However, these excused pupils should be called back at regular intervals, and given tests to determine whether the skill or association is being retained properly.

Learn under some pressure. This principle was briefly presented during the earlier discussion of memorization. Repetition is not necessary.

Use ready-made drill systems. Many hours have been devoted by scientific investigators to discovering good drill material, adapted not only to the various levels of the learners, but also to the special difficulties of the subject. No teacher could, in a lifetime, devise drill material equal to that which comes on the flash cards and practice sheets of commercial systems. Although formal, these are not cut-and-dried. They are the best available material for the purpose, and consequently valuable. Such ready-made drill systems are available from kindergarten to high school in all appropriate subjects—reading, writing, arithmetic, etc. They usually accompany texts in the primary grades. In any event, they can be secured by the teacher through her supervisor, or through the best known book companies.

Drill principles in memorization. The special application of drill principles to memory, in its strict sense, has been treated in detail earlier. It will suffice to give the following here: Analyze the thought content first; make the first perusal with unusual care; use the method of correct recall; use the whole instead of the part method.

Direct versus incidental drill. As part of the general protest against dullness and formalism in the school, there is occasionally the cry against drill of any sort. Not only is it dull and uninteresting, say the objectors, but it is formal, and the skills secured with drill material do not carry over into real situations.

Analysis of the situation seems to indicate, not that drill be done away with, but that it be made vigorous and interesting, and be supplemented with practice in applying routine drill skills in real situations.

In the first place, routine drill is not as dull for the child as for the adult who must plan and direct it. Children are often very enthusiastic about the routine repetitions, especially if there is any rhythm or game element present. The natural play of childhood involves much repetition

with evident enjoyment. It is probable that teachers dislike drill more than young pupils, and the protest represents their own view rather than that of the children. With older students, drill is prone to become a bit dull unless enlivened by some interest-getting device. The older the student the more rational the appeal must be, but drill can be made interesting if effort is devoted to it.

In regard to carry-over, the evidence is conflicting. There are some experiments which seem to show that drills in spelling columns of words do not beget accuracy in spelling these words in sentences and compositions. On the other hand, many of the words are spelled correctly. Very obviously much drill does carry-over, especially in the simple associations and skills. If it didn't there would be many people unable to add, multiply, subtract, and divide very well. Other experiments uphold the carry-over view.

It has been shown, also, that even in schools offering a rich content curriculum, and having well trained, well paid teachers, ability in routine skill suffers seriously when incidental drill is relied upon. In an early period, the University of Chicago Elementary School relied on its unusually rich curriculum to supply motive and incidental drill. Specific drill periods were omitted. Tests showed the pupils inaccurate, inexact, and unskillful in necessary basic skills and associations. The inclusion of specific drill exercises quickly remedied the matter.

Lastly, it may be pointed out that a very small amount of time is necessary. Short drill periods—four to twelve minutes per day—are sufficient.

So far as we know at present, specific well planned drill periods are necessary.

Interesting illustration of agreement between psychologist and practical teacher. The foregoing rules for drill are inferences based on the psychology of learning. Here and there is some experimental evidence. Many practical

teachers have outlined systems of practice in special fields, based on their own experience or theory. In many cases, these practical systems are quite absurd and actually handicap the learner. He learns eventually, but more slowly and more inaccurately because of the unpsychological rules. However, there are cases of almost perfect agreement between the rules of the psychological theorist and the empirical teacher. One of the best illustrations is to be found in Hofmann's *Piano Playing*.[7] His discussion of rules for practice is as follows:

Now, as to practice. Let me suggest that you never practice more than an hour, or at the most two hours, at a stretch, according to your condition and strength. Then go out and take a walk and think no more of music. This method of mental unhitching, so to speak, is absolutely necessary in order that the newly acquired results of your work may, unconsciously to yourself, mature in your mind and get, as it were, into your flesh and blood.

After every half hour make a pause until you feel rested. Five minutes will often be sufficient.

A valuable little hint here, if you will allow me: Watch well that you actually hear every tone you mean to produce. Every missing tone will mean a blotch upon your photographic plate in the brain. Each note must be not mentally but physically heard, and to this imperative requirement your speed must ever subordinate itself. It is not at all necessary to practice loudly in order to foster the permanence of impressions. Rather let an inward tension take the place of external force. It will engage, sympathetically, your hearing just as well.

With regard to finger exercises. Do not let them be too frequent or too long—at the most a half hour a day. A half hour daily, kept up for a year, is enough for any one to learn to play one's exercises.

A rule for memory exercises. If you wish to strengthen the receptivity and retentiveness of your memory, you will find the following plan practical: Start with a short piece. Analyze the form and manner of its texture. Play the piece a number of

[7] Josef Hofmann, *Piano Playing* (Doubleday, Page & Co., 1908), p. 19-27.

times very exactly, with the music before you. Then stop playing for several hours and try to trace the course of ideas mentally in the piece. Try to hear the piece inwardly. If you have retained some parts, refill the missing places by repeated reading of the piece, away from the piano. When next you go to the piano (after several hours, remember) try to play the piece. Should you still get "stuck" at a certain place, take the sheet music, but play only that place (several times if necessary), and then begin the piece over again, as a test if you have better luck this time with those elusive places. If you still fail, resume your silent reading of the piece away from the piano. Under no circumstances skip the unsafe place for the time being and proceed with the rest of the piece. By such forcing of the memory you lose the logical development of your piece, tangle up your memory, and injure its receptivity.

With regard to technical work. Play good compositions and construe out of them your own technical exercises. In nearly every piece you play you will find a place or two of which your conscience tells you that they are not up to your own wishes—that they can be improved upon either from the rhythmical, dynamical, or precisional point of view. Give these places the preference for a while, but do not fail to play from time to time again the whole piece, in order to put the erstwhile defective and now repaired part into proper relation to its context. Remember that a difficult part may "go" pretty well when severed from its context and yet fail utterly when attempted in its proper place.

As to the number of pieces. The larger the number of good compositions you are able to play in a finished manner the better grow your opportunities to develop your versatility of style; for in almost every good composition you will find some traits, peculiar to itself only, which demand an equally special treatment. To keep as many pieces as possible in your memory and in good technical condition, play them a few times each week. Do not play them, however, in consecutive repetitions. Take one after the other. After the last piece is played, the first one will appear fresh again to your mind. This process I have tested and found very helpful in maintaining a large repertory.

Discussion Questions for Summarizing and Testing on Problem 1

1. Using the numbered list of principles on page 346 of this problem, mark statements in the Hofmann quotation with the number of the principle to which they correspond. Write the

numbers in the margin of the page. Be ready to show in class discussion that your choice is correct.

2. Of the several rules given, three are so important that they should be utilized in all drill periods. Pick out the three that you think are the most important. [There will be some difference of opinion here but most of the class will agree on two.]

3. It is commonly believed by many parents and teachers that "children will outgrow" certain bad habits and undesirable actions. What do you think about this? What is the guidance for teaching?

4. Why are habits formed in youth much harder to break than those acquired later?

5. A fifth-grade teacher found her class growing poorer and poorer in spelling. She gave much practice, marked papers carefully, was generous with help to pupils after school, but to no avail.

a. What might be some of her difficulties?
b. What questions would you like to ask before advising her?
c. Assuming that you have answers to your questions, what advice might you give her?

6. A teacher read of a new device in arithmetic drill. Using it, the pupils gained tremendously for a little while, but soon lapsed back into their former attitude, gaining little or nothing. Diagnose this situation and advise the teacher, making at least two points.

7. Why do many older teachers of foreign languages decry the "direct method"? Answer this, not in terms of general objections, but specifically in terms of this problem. [If you do not know the direct method omit this question.]

8. The traditional method of teaching language, still common over the country, is to have the pupil learn rules and definitions followed by many written exercises of application. Evaluate this procedure critically.

9. A boy answering orally to certain addition combinations gets the wrong answer to $8 + 5$. The teacher gives another trial and he gets another wrong answer. This goes on for three or four trials when he finally gets the right answer. Was this the best procedure or should she have told him the right answer after the first mistake?

Observation Exercise for Problem 1

A slight formal variation will be found in this outline, in that the principles are numbered instead of the questions, making for ease of reference. This outline is to be used as the preceding ones, either as a basis for discussion or report.

General Questions

1. Are the associations or skills being drilled upon valuable enough to justify making them automatic?

2. Is the sum total of the teacher's effort toward the intelligent selection of associations and skills and the independent automatizing of them by the pupil in the future?

Teacher Activity

1. *A correct start followed by correct practice must be insured. Speed must wait upon accuracy.*

a. Does the teacher check to see that all have the correct response or reaction before starting drill?

b. Does she show patience in securing accuracy from all, rather than a high speed from a few?

2. *Zeal, interest, and concentration of attention must be secured and maintained.*

a. Does the teacher develop an aim, as in the teaching lessons? [This is often not present, but where possible an aim should be set up based upon the intrinsic worth of the material or upon such instinctive interest as fits the case.]

b. Does she initiate and maintain interest, either by this aim, or by other legitimate means?

c. Does she note quickly any flagging of attention? Does she change games and devices? Avoid deadening repetition?

d. Does she show wide knowledge of and skill in the use of simple devices, such as games and plays? Of more pretentious devices, such as group contests, exhibitions, independent work, etc.?

3. *Feelings of satisfaction and dissatisfaction must be considered, as they vitally condition the results of a drill lesson.*

a. Does the teacher show regard for the principle of individual differences, so that the slow ones are not dissatisfied because

of comparison with the faster ones? Are pupils grouped where possible? Do they compete with their own records?

b. Does the teacher use handicap games and contests to give every one a chance to show progress and success?

c. Does she use or call for the use of diagnostic tests in order to determine the nature and amount of drill necessary?

4. *Avoid waste of time on accessory and nonessential processes.*

a. Does the teacher make use of ready-made, scientifically constructed drill systems, sheets of problems, flash cards, games, completion tests, etc.? Failing these, does she construct her own, modeled after the ready-made systems?

b. Does she avoid writing long lists of problems, words, paragraphs, etc., on the board? Avoid having the pupils copy such things preliminary to the real drill?

c. Does she have a well organized routine for the handling of such material as is indispensable? For calling on pupils or the group? For moving them to the board, about the room in games, etc.?

d. Does she have at hand and train pupils in the routine use of books, references, vocabularies, notes, etc.?

e. Does she avoid drilling upon processes already fixed? Avoid drilling on errors that are not present, or upon skills that will be of little use to the group in question?

5. *The facts drilled upon in games and devices must be applied to and used in real situations.*

a. Does the teacher make sufficient and intelligent use of clothed problems, new completion tests, other books, real-life situations, etc., in which the new associations and skills are put to use in an appropriate setting?

6. *The drill periods should be short and distributed over a considerable length of time.*

a. Does she utilize the drill periods approximating the length of time that has been found experimentally to be the best for the particular subject (usually about ten minutes)?

b. Does she distribute these periods through the day, week, or other interval to accord with the needs of the situation?

c. Does the teacher make use of the standard score that accompanies most of the ready-made drill systems to determine the amount of drill necessary? To determine individual differences? To stimulate work? As a basis of comparison?

d. Does the teacher end drill abruptly or taper off? Does she

check from time to time after stopping in order to determine the retention by different individuals in the group?

7. *Use ready-made drill systems.*
[Covered under Rule 4.]

8. *In memorizing meaningful material, there should first be an analysis of the thought content. The method of correct recall should be used; the "whole" instead of the "part" method.*

a. Does the teacher introduce skillfully the analysis of thought separately or as part of the lesson?
b. Does she explain to pupils the method of correct recall and stimulate them to use it?
c. Does she stimulate learning by the "whole" method? Break up too long selections into thought units?

Pupil Activity

1. *Do students start and practice correctly the associations and skills?*

a. [For details in regard to original contact with correct model, *see* outlines for the preparation step and the setting of the model.]
b. Do most pupils work at their tasks without undue attention to what others are doing? Avoid hurried work in an effort to keep up with the speedier few?
c. Do they see errors and correct them as they go? Avoid hurrying over them?
d. Do all join in drilling in concert? Do some remain silent? Do any echo or repeat?

2. *Do the pupils appear alert and interested?* [The pupils' reaction to properly distributed drill periods will also be indicated here.]

a. Do they state the aim in clear-cut terms? Manifest an understanding of what they are to do?
b. Do pupils seem reluctant to leave or change a certain device or game?
c. Do they suggest new games and devices? Call for those they have enjoyed in the past? Do they invent new games?
d. Do they enter into the games and devices in the spirit of play?
e. Do they manifest a desire to change after a reasonable time? Do they manifest fatigue? Do their responses become less accurate after a time?
f. Do they show alertness and readiness to supply an answer that

is missed in flash-card drills or other devices involving answering in turn?

g. Do they avail themselves of every opportunity that arises to participate and contribute?

3. *Do the pupils seem satisfied with their work? Is their satisfaction based upon real standards of value?*

a. Do the pupils use standard scores and refer their work to the standard scales?

b. Do they refuse to be satisfied with poor work or discouraged by plateaus in learning?

c. Do they manifest satisfaction when they accomplish the work before them or show a gain in skill?

d. Do they participate enthusiastically in games and contests? Do they suggest handicap contests, group divisions, etc., that will give all a fair chance?

e. Do the bright students work steadily and in competition with each other? Avoid impatience with efforts of slower classmates?

f. Do the slower ones work steadily and in competition with each other? Avoid being hurried or rattled by the speed of the few best in the class?

g. Do they show normal progress for their age and I.Q.? Do they check frequently to see that they are retaining the standard score or scale value?

4. *Do pupils avoid waste of time on accessory and nonessential processes?*

a. Do pupils get their papers, pens, drawing materials, tools, etc., ready for work with a minimum of disorder and wasted time? Are pencils sharpened, tools adjusted, etc., so that class time is not wasted?

b. Do they move about room, to and from board, dictionary, reference books, etc., with a minimum of disorder and wasted time?

c. Do they begin at once? Avoid dawdling, asking unnecessary questions, making unnecessary remarks?

d. Do they answer in the fewest possible words?

e. Do they show by an attitude of universal inattention and lack of enthusiasm, coupled with correct answers, that the teacher is drilling upon an association or skill in which they have already become proficient?

f. Do any pupils refuse to give up old methods of procedure that now handicap the learning of the new?

5. *Do the pupils attempt to apply in real situations the facts and skills drilled upon?*

a. Do the pupils recognize situations in which drill facts apply?
b. Do they attempt to use associations and skills in other lessons? On the playground?

6. *Do the pupils in memorizing:*

a. Contribute actively to the lesson on the thought of the selection which precedes memorization?
b. Ask questions directed at understanding? Can they answer questions based upon the content? Reproduce in their own words when given a key sentence?
c. Stick to the thought units? Avoid slipping back into wasteful line-by-line methods?
d. Close books and try to recall? Ask each other to check on repetitions?

General Questions

1. Do the pupils learn to discriminate between facts worth remembering and those not? Devise intelligent and effectual methods of memorizing them?

2. Are the difficulties of the class normal to the average group of that age and grade?

3. Does the class in any way indicate the results of undue stress by the teacher upon speed, uniformity, etc.?

Parallel Readings for Problem 1

1. Courtis, S. A., *Teachers' Manual for Arithmetic Tests* (World Book Co., 1919). Brief discussion of good and bad points in drill.
2. Earhart, L. B., *Types of Teaching* (Houghton Mifflin Co., 1915), Ch. xii. Easily read.
3. McMurry, C. A., *Handbook of Practice for Teachers* (Macmillan Co., 1916), Ch. viii. Many concrete suggestions.
4. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1927), Ch. xxvii. Excellent specific discussion, one of the best available.
5. National Society for the Study of Education, *Eighteenth Yearbook* (Public School Publishing Co., 1919), Part II. One of the best summaries of rules for drill in writing, reading, spelling, arithmetic, and drawing.
6. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. viii.

7. Parker, S. C., *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919). Excellent discussion with concrete illustration.
8. Strayer, G. D., *Brief Course in the Teaching Process* (Macmillan Co., 1911), Ch. iv.
9. Waples, Douglas, *Procedures in High School Teaching* (Macmillan Co., 1924), Ch. xvii.
10. Wilson, H. B., Kyte, G. C., and Lull, H. G., *Modern Methods of Teaching* (Silver, Burdett & Co., 1924), Ch. x. Excellent concrete discussion.

PROBLEM 2

HOW MAY EFFECTIVE STUDY HABITS BE DEVELOPED?

Exploratory and Pre-Test Questions

1. Analyze your own study processes and be ready to report on:

a. How your procedure differs with subjects.
b. How your procedure differs with instructors.
c. How the instructor's assignment and method of teaching influences your studying.

2. If you have noticed the influence of your own attitude and understandings on study, be ready to report:

a. How your like or dislike for a subject affects your actual studying.
b. How your like or dislike for the instructor influences your studying.
c. How your understanding of the value of the subject influences you.
d. How knowing what to do and how to do it aids you. How failure to understand what to do handicaps you. Illustrate concretely.

3. What are some obvious indications that many students (perhaps including yourself) do not know how to study?

4. Consider your own study procedure (regardless of your actual practice), and report on the following:

a. Influence of amount of time and time of day.
b. Influence of immediate physical surroundings.
c. Influence of your present mental state, including the influence of immediately preceding mental activity.
d. Influence of your own present physical well being or lack of it.
e. Influence of yesterday's activities or of to-morrow's anticipated activities.

5. Do you study your hardest or your easiest subjects first?

What is study? Ever since books have been used in school, teachers have said to classes, "For to-morrow study

pages 67 to 75," or they have issued special warnings, "You will have to study hard on this lesson." Before books were used, lecturers referred to their classes as studying certain problems or topics. In everyday intercourse we often hear people say, "I'll have to study on that a while before deciding."

We are often astonished because people who are studying the same problem in life as we are, come to conclusions differing widely from our own. Why do some people make odd and peculiar blunders while studying out situations? Why do others become noted for their ability to take in hand a knotty situation and study it through to a just and fair conclusion?

What do teachers mean when they say to a class, "Study pages 8 to 12," or "Study hard"? What do people do when they "study a thing over"? What enables some people to study it out satisfactorily? What is responsible for faulty study processes on the part of others? These questions and other related ones, together with the great importance of the study process, have focused attention on this phase of learning. Inquiries among teachers on this topic justified the conclusion that by study they themselves often meant memorization. In many cases children who study, in reality memorize, and do little else. An analysis, however, of what people do when they study on a problem in real life, and an analysis of what children do when they study or work upon problems of their own, unhampered by having to live up to what they know the teacher will call for, reveal a process quite different from memorization.

Confronted with a problem, people usually form a conclusion as to the solution very quickly. The untrained or stupid individual is satisfied with this first solution. The person who studies the problem, however, attempts to find the reasons back of his conclusion; he looks for additional evidence with which to reject or uphold his tentative

solution. There is a process of searching for data; the individual "casts around in his mind," as we say. There is a movement back and forth between evidence and solution, until enough facts have been found to justify or break down the guess first made. In cases of considerable difficulty, where no solution presents itself immediately, the individual who studies carefully before making a decision, casts about for all the information he can find, weighs and organizes, and finally comes to a conclusion. During this study process, he preserves open-mindedness.

The following reports will show that children do some of the same things, in so far as they are able, when set to study upon problems in which they are interested, even though the problems themselves are not well assigned. A twelve-year-old girl in the seventh grade, known as a good student, stated that she did the following things when she studied:

a. Read the lesson over.
b. Read about it in other books.
c. Look up the words I do not know.
d. Make an outline or plan of each topic.
e. Put myself in place of one of the characters (history or literature).
f. Shut my eyes; think of it as a picture, one scene at a time.
g. In battles sometimes draw a plan.
h. Locate places mentioned on a map.

A good student in the tenth grade reported his procedure:

a. Read each separate paragraph to get main points.
b. Discuss freely to myself the main points and try to see relations.
c. Read it all over again to see if I have overlooked a point.
d. Look up the words I do not know.
e. Look in atlas for places mentioned.

Poor students show a lack of any such system or plan of procedure:

a. Read the lesson over.
b. Read it again to see if I have it.

Even worse, is the youngster who writes, "I just hop to it till I get my lesson."

These reports and many more like them, when analyzed, show that the good students were trying to find additional data and relate them to their problems, or were trying to think in several ways regarding the data already found. From a careful analysis, then, of what people do in real life when confronted with problems requiring study, and of what pupils do when not held rigidly for memorization of facts, the conclusion seems justified that the study process is the process of reflective thinking.[1] This statement has probably been so transparently obvious to many people for a long time that it may sound absurd to state it directly. But the direct implication, namely, that the technique of supervising study is the same as that involved in teaching lessons which necessitate reflective thought, has not been so obvious, if we are to judge by the numerous attempts to discover the technique of supervised study. A vast number of experimental classes have been conducted, much theory has been advanced, and many administrative devices have been applied—all directed at discovering ways and means of supervision. An unusually large number of classes have been so conducted, and much theory has been so written, as to give the impression that something new, different, and unique was being evolved; whereas the system of guiding and helping the student as he studies seems to be simply the application to him and to his indi-

[1] Some recent discussions of study present so-called "methods of study" for lessons involving memorization or the acquisition of skill. These would seem to be cases of drill or practice and not truly cases of study. There is also some tendency to use the term *laboratory methods* for what is properly supervised study. This point will be discussed again in Problem 3 of this unit.

vidual difficulties of much the same technique as that used in lessons requiring reflective thought.

The value of supervised study. As stated above, there have been a large number of experimental explanations of the study problem. Boiled down and analyzed by people not directly interested in the experiments, the results seem to reduce to this—that the slow students alone are helped, and the bright ones are actually hindered by supervision. In very few of the accounts is any space or attention devoted to the most important phase of the situation—the detailed technique of supervision—what went on during the period. Attention seems to have been focused on the subject matter used, the administrative devices, and the testing at the end of the experiment, rather than upon what happened to bring about these results. This is well shown in the set of conclusions advanced by Breed [2] on the basis of an extensive and highly scientific experiment. This careful work has done much to clear away the smoke screen of enthusiastic claims advanced by many less exact workers.

1. On the basis of average results for the whole class, work in algebra was a little less efficient under supervised study, English composition a great deal less efficient, and Latin alone stood out as showing great benefit from supervision.
2. Supervised study facilitated the progress of the slow pupil but to a correspondingly greater degree hindered the bright one.
3. The divided or double-period plan is not to be recommended until its efficiency is better proved than it has been to date.
4. There should probably be a selective or differential plan concentrating on the slow pupils.
5. The technique of supervising poor pupils needs to be improved; that of supervising bright pupils needs to be developed.

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[2] F. S. Breed, "Measured Results of Supervised Study," *School Review,* Vol. 28, pp. 186-204, 261-284.

An excellent summary of other experiments in the field, together with an analysis of theories and administrative devices, will be found in Hall-Quest, *Supervised Study*. This volume should be studied by teachers interested in this question. Later illustrations of experimental attack are to be found in the periodical literature.

Two types of supervised study. An analysis of Hall-Quest's summaries, together with a study of recent magazine reports, of which Breed's is a good example, will lead the reader to classify the schemes for supervision into two general groups. The emphasis is upon either the supervision of students who are studying at their desks, or upon training in the elements of the study process during regular classes. Still later writers have designated both types as *directed study* in preference to *supervised study*.

Which plan should be selected for the organization of supervised study? It matters little whether the emphasis be placed upon supervision of students at their desks or upon better methods of teaching. The conditioning factors in the particular situation are the time available and the training of the teachers.

In either case, there are four essential details. There must be (1) a selective mechanism to determine which pupils need supervision, (2) time to care for those needing assistance, (3) a system of extra assignments or voluntary projects for the brighter pupils, and (4) provision for group work. These are, of course, but the administrative details. The crux is the development of an adequate technique to use in actually supervising or directing study.

In determining which students need direction, the teacher should use diagnostic tests, written examinations, and interviews, and should make careful study of other teachers' reports. Time for supervising students at their desks can be provided by any of several administrative arrangements already mentioned, and determined by the

local situation. In cases where the teacher's aim is to initiate good study habits, it is probable that slightly longer periods will be desirable. This plan more than the other calls for experts, though highly trained teachers are vital in both.

Supplementary assignments may seem difficult to organize because of the time and effort involved. It will, in fact, take some time to develop a suitable repertoire of varied assignments. However, this must be accomplished, and it presents the opportunity for much originality on the part of the teacher. More will be said of this in Problem 1, Unit V, which deals with assignments.

While some pupils will be able to do much of their work independently, there are distinct values in group work, in discussion, and in properly conducted recitations.

It is clear that supervised or directed study is a phase of the problem of adapting instruction to individual differences. The technique advocated here is one lying between the old-fashioned memorization and quiz recitation procedure, and the extreme adaptation in which the individual is taught independently of all other pupils. The great majority of teachers will have to do their work in situations remote from extremes. Some form of procedure involving the elements set forth above, providing for individual supervision at times and teaching study habits at others, will doubtless prove practical. This will avoid the evils of bad recitation procedure, the dangers of extreme individualism, and give the pupil his own independent technique.

The assignment and the recitation in relation to study. Obviously, both the method and type of assignment, and the conduct of the recitation period, are vital factors in the study process. If the assignment is of the ground-to-be-covered type, obviously true study will not result. If it is not motivated, not detailed, not understood, study cannot

result. As stated in earlier pages, the assignment should (1) arouse interest, (2) recall necessary old knowledge, and (3) set clearly before the pupil what is to be done. More will be said on this in Problem 1, Unit V.

The recitation. If the recitation is a period in which isolated, formal facts are called for, the study process will degenerate into memorization, and no real power will result for the pupil. But if it is a period in which thinking is done, in which questions directly stimulate thought, in which time is allowed for thought to take place, and in which references can be studied and evaluated as they are necessary, then the ability to attack and study new problems should be gradually acquired by the pupils.

The term *recitation* was until recently the most common one in the teacher's vocabulary. It meant any and all class exercises. If we break the word up into its parts—*re-citation*—we find that it was not an ill chosen term as schools were commonly conducted. Class periods were usually given over to the *re-citing* of knowledge which had been memorized and carried over bodily from its original citation. Occasionally such an exercise is necessary and legitimate. Classes must sometimes be held for accurate knowledge of dogmatic facts that are memorized more or less exactly and given in answer to direct questions. Such exercises justify themselves only by contributing to a reflective-thought process in some way. Drill lessons also often involve such a procedure. However, the activities of the recitation or daily class period are now widely different from what they were some years ago. The class period has now come to be regarded as one of training and learning through active participation by the pupil. It is no longer a period of marking time between study periods, but a period where thought is carried forward and new work taken up. Newer methods of administering the class period have given rise to such terms as the *contribution*

recitation, the *socialized recitation,* or the *how-to-study lesson.*

The contribution recitation. A good combination of individual and group work can be based on assignments of topics, or phases of a topic, to individuals or small groups for investigation and report. Training in the discovery, organization, and evaluation of data is secured, together with practice in the drawing and verifying of inferences. In reporting, the pupil must organize his material so that it will be of interest to his audience. He will receive training in clear expression and in self-confidence. During the reports questions should be asked, and afterwards there should be a free give-and-take discussion. Such a discussion, stimulated and guided by the teacher, is a widely different procedure from the old-time recitation of isolated facts. In the hands of a skilled teacher, it is one of the most efficient teaching devices, though it is often difficult for the beginner. Its merit is, obviously, in the stimulation of the thinking processes, interest, and initiative of the pupils. It is a sad commentary on teaching that it takes some little time to make children understand that they may express opinions, argue and debate, question, and ask for further information. The very highest type of training is being given when pupils are stimulated to participate and advance opinions, and are held for evidence and proof; when they become interested enough in their own arguments to hunt up further evidence, and to organize it for presentation; when there is free interchange of ideas.

Often such a lesson is not based upon assigned topics, but may come at the very outset when a new topic is being taken up. The class can be stimulated to discuss ways and means of attacking the new problem, even reasons for attacking it at all. Many of them will have experiences from real life to contribute. In either type of lesson, then, the pupils are contributing what they know or have looked

up, and it is from this that the lesson gets its name, *contribution recitation.*

Because of the fact that every child takes part as he can, or is given the opportunity to, because there is participation by all on equal footing, the same lesson type has also been called by many people the *socialized recitation.* Still other people saw in such lessons a golden opportunity to teach children the factors of study, and so have dubbed them *how-to-study lessons.* All of these terminologies apply equally well to the technique involved, and it matters not which is used. The new name does not designate a new and different type of teaching; it merely places emphasis on an excellent device for the better application of an old principle. Contribution or socialized recitations are usually parts of the presentation or inspection steps of lessons involving reflective thought, though they may also occur during the preparation step. Occasionally, they may precede the learning of a motor skill. As stated above, the new terms may be used if they make understanding any easier, but the technique of the lesson is the same as that discussed in Problem 4, Unit III. There is added emphasis on stimulating the pupils to contribute and exercise initiative and self-activity. There is also a caution to be noted—that such lessons must not be allowed to wander aimlessly during the discussion.

Some enthusiasts have insisted that the only type of recitation entitled to the designation *socialized recitation,* is that in which the teacher turns the period over to the class, or to a committee, and withdraws from active participation. A socialized recitation is one that approximates a real social situation. Obviously, elimination of the teacher is not fundamental. Would one conclude that a teacher is not socially eligible to associate with her students? The teacher may play an important part and still have a *socialized recitation.* While minimizing teacher

participation is highly desirable, and is probably one of the outcomes of socialized recitations, it is not correct to limit such recitations to this one type. The essential or fundamental thing is not that the teacher's efforts are reduced, though that is desirable, but that the class be stimulated to the freest discussion, to give-and-take argument, to search for and evaluate data—in short, to group activity and cooperative effort. This procedure can be applied to construction projects as well as to the solution of thought problems. In both cases, differing degrees of teacher guidance may be necessary.

The developmental method. A term much older than those just discussed, and having in part the same meaning, is the *developmental method.* It is used to designate that type of lesson procedure in which the teacher develops the topic or subject by means of questions. It was first applied to the lesson in which the pupil contributed from his past experience, and organized this experience into new generalizations, or solved new problems. That this is the original meaning is quite clear from use in original German sources. Throughout the German literature on pedagogy, appear references to a mode of procedure designated as *entwicklend-darstellend*—an unwinding, unraveling, spinning out of a presentation. All specific lesson plans and lesson reports available are of conversational, discussional lessons. However, the term has been used very carelessly, being applied not only to lessons in which the pupils reported material recently studied, but also to lessons in which the teacher developed the topic by lecturing. Because of this confusion, Parker [3] suggests the use of the term *conversational method.* This designation shows more clearly the relationship to the contribution or socialized recitation. The developmental or conversational method is not a

[3] S. C. Parker, *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. xviii.

separate and distinct lesson type, but a teaching device in the hands of the teacher, to be used where applicable in the course of lessons involving reflective thought. This developmental or conversational procedure has many legitimate uses. It adds interest. It is an aid to problem solving, stimulating the learner to vigorously analyze the problem, compare and argue about data, draw conclusions, or refute through the comparison of ideas. Assignments may also be made *developmentally*, that is, on the basis of discussion looking toward clarification of the problem and understanding what to do.

The procedure has certain dangers which must be avoided. It (1) wastes time when used on simple material, (2) admits of wandering and pointless argument, (3) admits of minute quibbling, and (4) is hard to adapt to individual differences. Certain teachers, either because they are lazy or do not understand the nature of thinking, approve of unorganized and wandering discussion. They delude themselves with the belief that the pupil is getting training in self-expression and thinking. He is, in fact, getting training in not sticking to the point, in not organizing material, in not considering data systematically. He is being trained in hazy, inexact, "sloppy" thinking.

Obviously, the recitation technique used vitally affects the study activities.

The technique of supervision. The activities of actual supervision, as have been emphasized throughout this chapter, reduce in any event to the activities of guiding and stimulating thought. The foregoing points in regard to supervised study are well summarized by Hall-Quest: [4]

Supervised study is that plan of school procedure whereby each pupil is so adequately instructed and directed in the methods of studying and thinking, that his daily preparation will progress

[4] From A. L. Hall-Quest, *Supervised Study* (1916), p. 29. By the permission of The Macmillan Company, publishers.

under conditions most favorable to a hygienic, economical, and self-reliant career of intellectual endeavor. It seeks to prepare pupils not simply for high-school graduation or courses in higher education, but to an even greater extent for successful coping with problems in a world of intense competition, where superior achievement depends on initiative, clear thinking, and confidence in one's ability to organize experience for new adjustments. What is aimed at in supervised study is an individual who is trained to attack problems and to organize experiences into large controlling concepts, and who, moreover, has acquired the ability to initiate or to serve without merely doing what he is told to do. The world of business is choked with unthinking imitators who, parrot-like, repeat exactly what has been said, but who cannot be depended upon to perform a task without being given constant and minute directions.

The world at large, business, and professions are crying for independent thinkers, men and women who see a task and who can readily work toward its successful accomplishment without being watched at every step. College needs them. Pitiful is the ignorance of students in a library, or in their attempt to make an original report. Inaccuracies, haste, confusion abound. But they were able to enter college simply because they had certain units of subject matter! The world smiles and sneers at our ludicrous formalism. The time is ripe for another class of young people. Our high schools must face the need of producing young people who in every phase of school life have been taught the meaning of and have been trained in the exercise of accurate, organized, independent, and practical thinking.

Hall-Quest's discussion is in terms of high-school subjects and pupils, but the same points apply to the grade pupils as well.

The big defect in most of the supervised-study literature is that there is very little specific discussion of the actual procedure to be followed by the teacher. Such a discussion could be worked out by a teacher or a group of teachers on the basis of several months' detailed supervision work. It would include illustrations of many actual cases of pupil-difficulty and teacher-help. It would, however, be a voluminous piece of writing. The best that can be done

here is to list the general classes of problems that are likely to arise, and to suggest general principles under which to operate.

Lack of interest. Many pupils find studying difficult, not because they are incapable or because the material is involved, but because there is no real desire to work. There is no underlying urge, even though the student thinks he is trying to work. Good work cannot be done unless there is interest and attention. The teacher must make the intrinsic worth of the material so clear that it supplies motive, or she must make an appeal to some natural interest. Occasionally such cases are disciplinary, rather than pedagogical, and must be dealt with accordingly. In any event, the student's attitude is vital and well worth studying.

In many instances, the study supervisor's attention should be directed not directly upon the pupil but upon his home conditions, work and play activities, and his past school record. A fourth-grade boy who appeared to be normal in every way, failed everything in the fifth grade and was sent to me for examination. He seemed a little listless, but not markedly so. He was willing and docile, his intelligence quotient was normal, and he seemed to have no physical defects, but he did not progress. Inquiry, however, revealed the fact that he arose at four o'clock in the morning and helped his father milk a number of cows, walked four miles to school, had a cold lunch at noon, and walked back just in time to assist with the chores and evening milking. This youngster did not have energy left with which to do the work, no matter what the appeal. Many times inquiry will reveal home conditions or physical defects that are inimical to the pupil's best efforts in study. Seemingly dull pupils are often made over through remedial measures applied early enough. There are a vast number of physical conditions other than those briefly referred to

here, and the supervisor is referred to Hall-Quest, Chapter IV, for a better discussion of such factors.

Inability to see the problem clearly. Many pupils' difficulties in studying resolve themselves into a lack of understanding of what they are to do. Even when the assignment is clearly and definitely made and seemingly clear to every one, there will be a few individuals who do not know what to do, and furthermore, who do not know exactly what is the matter. Here, if anywhere, a teacher is justified in giving direct assistance. A word or two, a brief explanation, will often make definite and concrete a problem that was vague and hazy, and that offered no avenue of approach or criterion of judgment to be applied to data. That is, the teacher may restate the aim or reset the model. Care must be taken, of course, to see that such procedure is not followed in the case of the lazy, inattentive pupil, who will be better served, probably, by a little sharp treatment.

Breslich [5] reports a case in which parents complained that too many problems were assigned and no suggestions given. The teacher, much surprised, outlined his explicit method of assignment, in turn surprising the parents. The student admitted hearing all this, but did not see how it related to her problems. Here was a case of poor original learning, or downright inability to see problems. Individual attention is the only solution.

Lack of knowledge of sources. Quite often students come to a halt and are unaware that more information is what is wanted. Or again, they may appreciate the lack of knowledge but not know where to look for it. In some cases definite reference should be made to sufficient sources

[5] E. R. Breslich, "Supervised Study as a Means of Providing Supplementary Individual Instruction," *Thirteenth Yearbook* of the National Society for the Study of Education (The University of Chicago Press, 1914), pp. 32-72. *See also* "Teaching High-School Pupils How to Study," *School Review,* Vol. 20, October, 1912, pp. 506-515.

in the assignment. But the pupil must be held more and more for responsibility in finding other sources than those given, and for the particular sources to use in finding certain types of information. This involves teaching pupils to use dictionaries, encyclopedias, indexes, guides to periodical literature, etc. There should be direct, carefully planned lessons for some of these things, and later pupils should be expected to use them independently.

Not only must pupils find sources, but they must be trained to judge the worth of them. In a lesson on Mexico, one little girl reported that the best way to help Mexico would be to go there with an army and clean up the country. Asked why she thought so, she replied, "Mamma says that since Mexico is just a little place about as big as Arizona we could conquer it quickly." While it is usually dangerous to discuss what "Mamma says," this pupil was set to work comparing Mexico with other countries and states in regard to area and population. It proved a valuable exercise for her in the matter of judging reliability of sources.

Inability to judge the worth of facts. Obviously, pupils are not discriminating between facts and ideas when they attempt to remember everything they read, or when they advance any one fact as of equal value with any other. This is one of the most difficult phases of study supervision. The fault is easily recognized but difficult to remedy. Sometimes a fact given by a pupil is so inconsequential that it could be totally elminated from the discussion without loss. Or questions are asked that indicate a lack of knowledge as to the issues of the lesson. Elaboration of such cases will assist the pupil in seeing the relative values of facts. Attempts to have the pupil connect the idea or information definitely and directly with the question being solved will help to set up a criterion of judgment. To pin a pupil down for exact relationships between his statements

and the class discussion is a good device. Training students how and when to skim and read rapidly, and when to read slowly and carefully, is beneficial. (See Problem 4, Unit IV.)

In discussing this phase of study with a sixth-grade class the teacher advised them to read several books and select such facts as bore on the lesson. One boy asked, "How do we know what is wanted?" and another answered immediately, "You can tell by looking at the set of questions on the board." This shows that some of the pupils realize the point at issue here, while others are quite at sea. Later on in the same lesson, some one mentioned reading paragraphs or pages to get the "main thought," and the same boy said, "What gets me is how you know your real main thought." Probably the teacher could have said that it would "get" her if she had to explain fully how one does know. But this is an important difficulty in study and the teacher must try such devices as the particular case suggests. Asking such questions as "Do these facts relate to the problem?" "Do they aid in answering any of the study questions?" "Do they seem to contradict any other facts you have gathered?" etc., will help the pupil to set up a standard of judgment in regard to facts, and eventually he will ask these questions of himself. If the pupils manifest a marked and continued inability to answer these questions while studying, they are probably retarded. But we should be extremely cautious in deciding that it is a case of "continued and marked inability." All other possible causes for such a condition should be sought out first.

Difficulties with organization. Many grown-ups as well as children become swamped with information. They forget whether or not certain sources have been consulted. They remember finding certain facts and discussions but do not remember where, nor have they any notes. If notes are taken, they are often not in outline form and there is no

key to the material. Other problems arise from inability to see that the search for data has gone far enough. This is because there is no system of quick reference to what has been done. The use of the outline should be taught either in the course of the regular lessons or as a separate formula. Diagrams, charts, and figures to represent relations between facts are easily mastered by fifth-grade pupils and should be used. All the devices the teacher can use to cause pupils to "take stock," to organize into compact form, or to represent graphically what has been done, will assist in this difficulty.

Difficulties arising in drawing inferences or making generalizations. Closely related to the difficulties involved in gathering evidence, or analyzing situations, are the problems that arise in the making of guesses or inferences on the basis of the information gathered, or the analysis made. Sometimes the pupil's reaction to the problem will take the form of a wild guess. Before help can be given, the teacher must inquire into the possible causes of the statement.

A little girl was asked what difficulties probably confronted the Swiss people in forming their government and she replied, "Trouble with the Indians." Evidently her study of the American struggle for independence was in her mind, and this answer popped out. In many cases, however, the guesses will apparently have no basis in past experience, and seem to be made for no reason. Skillful questioning by the teacher is called for, and often a basis will be found in an erroneous apperceptive process. Failing this, the pupil should be asked to show how his remark bears on the question, or how it is justified by the evidence. Requiring analysis from the pupils will eventually train them to base their inferences on better evidence. Obviously a part of the difficulty is the inability of young pupils to suspend judgment. The talkative, superficial

pupils, the bluffers, and the ones with flighty attention are the chief offenders in bringing in answers that have no very thorough basis of evidence. These pupils also manifest an ability to construct elaborate inferences on the flimsiest of foundations. Holding such pupils for analysis and explanation is probably the best device, though in some instances they become disciplinary cases.

It should be noted in passing that some dull or slow children make wild guesses because they cannot keep up with the thought of the class, in which case the teacher's attitude will be different.

Difficulties with analysis. A retarded student is reported as having said:

> If there is lots of numbers I adds. If there are only two numbers with lots of parts (digits) I subtracts. But if there is just two numbers, and one littler than the other, then it is a hard problem so I divides if they come out even, but if they don't I multiplies.

Despite the fact that there is a certain definiteness of attack here, it is not the type of analysis desired! Of course, the difficulties of the average student will rarely approximate the situation here portrayed. Nevertheless, the pupil is often unable to tell which rule to apply in arithmetic or grammar, which procedure to follow, what to do next. The teacher's questions will then be directed toward analyzing and outlining the problem so that its principal parts will stand out. "What is given?" "What is asked for?" "How do you proceed to get that?"

Often the difficulty is in the language, or in a negative statement which a question or two will clear up. One student reported that the Battle of Bunker Hill was the only victory the British won during the Revolutionary War, and asserted that the book said so. Inquiry developed that the book said, "The British cared for no more victories at such a cost." A hasty and poor reader is often confused

by such indirect discourse. Inability in language analysis that is long continued probably goes back to original learning. If this is shown to be insufficient, the student must be sent back to do more work with the fundamentals.

A college team playing hockey found that they could secure the ball and work it down the field again and again only to fail in shooting the goal. Discussion was called for. The forwards doing the shooting were unable to analyze the difficulty, but a half-back standing behind the line of play discovered that the forwards in shooting goal shot straight at the guards every time, instead of shooting at open spaces between guards. With attention focused, and with a position of vantage, the observer was able to analyze the specific weakness.

Memorizing in study. The foregoing discussion should not lead one to believe that memorizing does not play a large part in study. The emphasis is rather upon dislodging memory from its position of the past, in which it has been practically synonymous with study. Psychologically, facts are remembered better when they are learned by means of a thought process than if held by rote memory. In the former case, many associations are formed and the material can be reached from several angles. Therefore, the thought process here elaborated as the real study process, is itself a definite aid to memory. In addition, it selects the facts worth memorizing more efficiently than did the older method of study. The rules of practice elaborated in Problem 1, this unit, and in Problem 3, Unit III, should be applied to the memorization of facts that are valuable enough to warrant making automatic.

General point of view for the teacher. The teacher in supervised study should regard herself as a diagnostician, whose duty it is to find the specific difficulty and prescribe the remedy. This means that she must be highly trained in all the general principles of educational psychology. She

must have time to work with pupils and discover their individual difficulties. Above all, she must be expert at discovering the mental processes of her students, and expert in directing and guiding these processes.

In all her supervision, she should be dominated by the idea of so helping that she enables the pupil to find and correct his own difficulty and thus gain in power. A teacher who does the work for the pupil, explains explicitly, or allows herself to be used as a crutch is a detriment instead of a help in study. The instance is related of a study coach who was "worked" by pupils who came after school for help. She explained so clearly and completely that the pupils copied the work as fast as they could. In the morning they could put the problems on the board correctly but could not explain them or work new ones involving the same principles.

Objections to supervised study. Few objections to supervised study are found in literature on the subject. This is probably because most of this literature was written by people who were describing their own plans of work. However, many of the more recent experimental studies point out, as quoted above, that there are some defects and that all is not gain as was supposed. These statements are not objections but are in the nature of guidance toward a shift in emphasis.

However, there is a class of objections registered quite often by teachers and others, that centers on the factor of assistance given to the pupil by means of supervised study. The answer to these objections is well summarized in Hall-Quest: [6]

> The objection often urged that supervised study prevents the pupil from relying on himself is answered sufficiently by suggesting that without it he does not rely upon himself, but instead

[6] From A. L. Hall-Quest, *Supervised Study* (1916), p. 23. By permission of The Macmillan Company, publishers.

enlists family, friends, and classmates in his behalf. Home study is harmful, not only because unhygienic but also because it tempts the pupil to claim as his own work what others have done for him. Problems in mathematics, theme writing, and outline work are referred to others whenever feasible to do so. This is natural. The difficulties are severe, the assignments are unreasonably long, and class marks are usually impersonal. What is a pupil to do? Let him without offense in this type of home study cast the first stone.

Supervised study means working with the pupil but not for him. It is preventive. It deals not merely with subject matter but with the methods of learning it, and for this reason it is necessary that the teacher for a considerable time devote part or all of the class period to this fundamental of learning. The . . . pupil must be taught how to think, how to organize, and how to apply.

These objections, then, would seem to be based upon a misconception of the real meaning of the term.

Apart from the foregoing pedagogical criticism, which is easily answered, there seem to be three sources of difficulty often resulting in criticism. Very often (1) the situation is not favorable for introducing supervised study, (2) the teacher is not mentally prepared to coöperate, and (3) the teacher, though willing, does not possess an adequate technique.

It is impossible for an enthusiast to come home from summer school after a brief discussion of supervised or directed study, and arbitrarily introduce the matter into a situation which is not prepared for it. The story is told of one superintendent who announced to his teachers one Friday, "Beginning Monday we will proceed on the supervised study basis." In most cases the situation will have to be prepared, the idea explained, its merits and dangers discussed, the community won over. This may take three months or it may take a year. With opinion won, it is then time to make such administrative adjustments as are necessary.

The teaching staff must understand and be in sympathy with the movement. In many places where supervised study has been hastily introduced, the teachers have actively opposed it, have refused to coöperate, or have hailed the supervised period as a relief from work. While teachers read papers, visited, or did their own work the students were turned loose to "study." The teachers' attitude toward the pupils and their work is embodied in the remark of an old colored man to his mule. Driving to the field on a hot day, the man turned the mule loose, lay down in the shade and said, "Go where you wants, mule, it's all gotta be plowed."

This leads us to the third weakness, lack of technique. As indicated above, this is the serious lack in the literature on the subject. It is, however, not a difficult nor mysterious affair. The technique of supervising study is but the technique of good teaching applied more explicitly and, in some cases, individually.

Shall the elements of the study process be given to pupils directly? Objections to acquainting the pupil with the factors in study have nearly disappeared. After pupils have had lessons assigned properly and carefully, after they have worked these assignments out carefully, after they have participated in recitations calling for free discussion, evaluation of information, and inference, they should be able to grasp the elements of a good study process. In fact, the brighter pupils have it already. The few who cannot get and apply it independently will probably be in the lower 10 per cent of the class. It is not expected that all can be taught to study and think independently. As has been stated above, it is reasonable to hope that after a pupil has passed through several grades of the best teaching, he will be so equipped that supervised study will be unnecessary. This condition will probably be deferred for a long time to come, and the first step

toward it would seem to be the raising of teacher-training standards at every opportunity.

As stated above, the bright pupil knows how to study. In making the process more explicit for him and the others who can grasp it, overconsciousness of method should be avoided. As indicated earlier, study is the normal process of thinking. There is no mystery about it, though early discussions of "learning to study" and "supervised study" seemed to indicate a new and recondite process. Present discussion of teaching college freshmen to study indicates that the higher schools—now having heard of this pedagogical procedure long extant in the lower schools—are in a stage similar to the high school a decade or more ago. To repeat: making the student aware of the study process is only making him more analytic about a thing he does anyway. Given a normal mind, an interesting problem, and adequate material pupils will study anyway.

Should home study be done away with? If supervised study is to make for independence in attacking and studying new problems, obviously there must be definite provision for other study than that done at school under the eye of the teacher. Furthermore, if learning is to approximate life whenever possible, it must be a continuous process both in and out of school. Supervised study should not, as some think, supplant home study entirely. Project teaching that involves work both in and out of school, and that stresses continuity of effort, will do much to place study in its proper relation to the rest of the learning process.

The use of rules or programs for unsupervised study. Partly as a result of early attempts to improve ordinary unsupervised study habits, and further developed as an aid in directed study, rules and principles of guidance have become prominent. There seems to be good evidence that time-study and place-study habits, together with other habits of regularity, are of assistance. Many attempts have

been made to develop such handy sets of guiding statements. Each student, however, when he needs them, should develop his own.

Monroe [7] presents for the individual student, the following summary of guidance based upon a consideration of several suggested sets of rules.

1. Successful study is difficult in a room which is not warm, well lighted, well ventilated, and otherwise physically comfortable. Successful study is also difficult in a room where there are other persons, or where there are disturbing noises or objects. Thus, the first step to be taken is to provide a physical environment which will not interfere with effective study.
2. Make out a daily schedule in which you assign a regular time and place for the study of each subject.
3. Plan to study an assignment as soon as possible after it is made; then review the lesson briefly just before going to class. Do not wait to study a lesson until just before class because you will have difficulty later in remembering what you study.
4. Before you start studying a lesson collect all of the texts, reference books, and other material which you will need so that your work will not be interrupted.
5. Begin working as soon as you sit down, with the determination that you will keep your mind on your lesson, that you will study for all you are worth, and that you will complete your task as quickly as possible. Do not waste any time getting started.
6. Begin your studying by recalling the main points of the previous lesson, and then get clearly in mind the assignment which you are to study.
7. At the end of your lesson, summarize briefly what you have learned. In this summary the most important points should be clearly stated. Usually this summary should be written.
8. Watch carefully for items which you are unable to understand and check them for the purpose of asking your teacher for an explanation. Plan to ask your teacher at least one good question on each lesson.
9. Keep studying until you are certain you have your lesson or know just what the difficulty is.

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[7] W. S. Monroe, *Directing Learning in the High School* (Doubleday, Page & Co., 1927), p. 422.

Monroe follows these general directions with rules more specifically applicable to certain types of subject matter. He also suggests a method of checking one's study habits in order to diagnose difficulties.

Many similar sets of rules are to be found and all are helpful. They all have, however, one serious limitation, namely, that they are impregnated with the textbook-assignment point of view. Improvement is to be noted in the more recent statements, but the weight of the traditional method of studying books is to be felt.

Physical conditions favorable to study. Most of the general treatises, and a few of the experimental studies on this topic, devote some space to the effect of physical conditions on study. However, it is to be noted that in supervised study which is done at school many of the physical conditions are relatively fixed by the room and building. Since it is done at regularly appointed periods, the matter of study programs, and of individual work habits is of less importance. There are also many other factors which affect study very vitally, but which are beyond the teacher's control in large measure, such as food, sleep, amusement and recreation, home life, health, work attitude, etc. The best discussion of these things will be found in Hall-Quest, *Supervised Study,* Chapter IV. The teacher should read Hall-Quest, Parker, Whipple, Kitson, Sandwick, and others to gather a rather complete knowledge of these outside factors in study. They should then be presented directly to the pupils in lessons or talks. The coöperation of both pupils and parents with the school is to be sought.

The review as a method of study. Time was when the last few weeks of a term or semester were dedicated to review. Frequently this review was in reality a drill process. The old material was passed over again just before examinations in an effort to recall much that had

faded, and to stamp in those facts deemed essential by the teacher. The process was repetition. We now distinguish between a drill and a review, in that a drill attempts to make fixed and automatic certain associations or skills, while a review is the *re*-viewing or *re*-teaching of old material for the purpose of gaining new associations or getting a new view. It is a form of study. A review has some of the drill element in it, of course, because it aims to make more permanent in the learner's mind certain logical associations and ideas. Its aim is better accomplished, however, by means of a new teaching lesson, rather than by repetition. Even the attentive repetition characteristic of good drill lessons is not an economical way of handling material fitted to the true review lesson. In the main, the drill lesson is used for the formal subjects in which fixed associations have to be learned accurately and made automatic. The review lesson functions better in the content subjects, where learning is better served by increasing the number of logical associations, than by rote memory.

A well selected and skillfully taught review lesson is an index of teaching ability. Teachers with a good view of the course of study, and possessed of the ability to see relationships not immediately apparent, can construct such lessons. The review of the old material is often introduced so skillfully, and with such seeming inevitability, that the class will work hard on material they already know from one angle, thus gaining in associations and power of recall. They will not feel that they are repeating work that has already been sucked dry of interest. The new project or unit organization gives excellent opportunities for such review lessons.

A teacher in the intermediate grades taught the "William Tell stories" under the aim, "Let us see how William Tell became the 'Father of his Country.'" Before the series of lessons was over, the class had recalled and discussed

practically all they knew of the life and activities of George Washington during the Revolution.

Another class working out the aim, "Let us see why we should swat the fly," reviewed and restated much that they had learned previously under a different aim regarding germ carriers. An upper-grade class working on the aim, "Let us see why we have the Civil Service system," obtained a very good review of the "Spoils System" which they had studied previously under President Jackson's administration. In lower-grade history, the study of any great leader can be made the excuse for reviewing those studied before; for instance, "Let us see how Napoleon was like Alexander the Great." The introduction to the reading of "The Man Without a Country" might well be a review lesson involving the previous study of Aaron Burr and Benedict Arnold. There is unlimited opportunity for the individuality of the teacher in planning these lessons. The technique involved is that of the lessons involving reflective thought.

Wherever any amount of old knowledge can be recalled and used in connection with new lessons, new associations are formed making recall easier and understanding more complete. Much incidental review is obtained in the preparation and presentation steps of some lessons.

Observation Exercise for Problem 2

1. Are the physical conditions within the room (heat, light, ventilation, noise, etc.) the best possible, considering the means at the teacher's disposal?

2. Are reference books, dictionaries, encyclopedias, etc., accessible and well placed? Do the pupils use these in a quiet and orderly manner? Are such passing and communication as are necessary well routinized?

3. Is interest initiated and maintained? Are pupils kept at work? Are those excused adequately provided for? Are disturbances calling for disciplinary measures handled quietly and effectively?

4. Is the studying an active, aggressive process? Does the teacher avoid undue dominance? When necessary are small groups set to work together? Can they work together quietly and purposefully? Can they find, prepare, and report new data?

5. Does the teacher adapt and apply to individual difficulties the general technique for stimulating thought as outlined in Problem 4, Unit III? [This is, of course, the crucial thing in supervised study, and involves the application of a multitude of points. The discussion should be re-read and be kept clearly in mind when assisting a pupil.]

a. Is she quick to see the real difficulty?
b. Skillful in probing for it when it is not immediately apparent?

6. Does she make note of those pupils whose difficulties go back to insufficient learning of formal associations and skills, and see that they get extra drill as they need it?

7. When a difficulty is found to be fairly prevalent with a majority of the class, does she stop the group and discuss it for the benefit of all? Is there direct reference from time to time regarding the factors of study? Regarding physical conditions, health, home conditions, study program, work habits, outside activities, etc.?

8. Is the sum total of the teacher's efforts directed toward the development in the pupil of the ability, actively and independently to attack and study new problems?

Discussion Questions for Summarizing and Testing on Problem 2

1. Examine the problem stated below, disregarding its value as a problem.

a. Make an organized list of suggestions you would use to start a pupil who was unable to proceed for himself.
b. Be able to classify your suggestions in terms of thought stimulation. [*See* Problem 4, Unit III, and early pages of the present discussion.]
c. At what points would the average student be likely to go astray? Locate these and work out suggestions you would make to assist him.

[A good device would be to get a seventh- or eighth-grade pupil to work the problem for you while you endeavor to assist him.]

John left Central Square at nine A.M., riding a bicycle whose wheels were each 30 inches in diameter, and rode for two hours, pedaling at such a rate as to make ninety revolutions of the rear

wheel per minute. After stopping 20 minutes to rest, he continued but at a rate only two-thirds as fast. Fred started from Central Square at ten A.M., followed the same route as John for one hour, then rode a mile off the road and a mile back again. He then continued after John. His wheel was so geared that each revolution of the crank shaft carried him the same distance as a wheel 72 inches in diameter would carry any one in a single revolution. He pedaled throughout at such a rate as to make 36 revolutions of the crank per minute. How far behind John would he be at 12 o'clock? [8]

2. Explain the following situations:

a. In a supervised study hour many hands are up, there is a continuous call for the teacher's guidance. Pupils did little until the teacher came to them and soon needed help again.

b. Parents welcomed supervised study as a modern procedure, but soon noticed that the children were not learning, in fact their standard scores were lower than neighboring cities.

c. A superintendent refused to introduce supervised study, saying that it was a waste of time where he had observed it—that teachers merely used the time to correct papers, to prepare other lessons, to read books, etc.

3. List a number of dangers which superintendents and teachers are likely to fall into in introducing and carrying on supervised study.

4. Recall and be ready to describe cases in your own study where you would have liked a little explanation or help from a teacher.

5. Recall and describe some cases where you were in a position to get help and did so.

6. Cite specific cases in which the instructor's assignment affected, for good or ill, your studying.

7. Do the same for her handling of the recitation.

8. What is your candid reaction to definite programs of study, study rules, etc. List advantages and disadvantages.

9. Look up several sets of rules for study (*see* Parallel Reading) and make up a brief set which suits you.

Parallel Readings for Problem 2

1. Book, W. F., *Learning How to Study and Work Effectively* (Ginn & Co., 1926). Includes more than strictly "study." Many good concrete suggestions.

[8] E. L. Thorndike, *Principles of Teaching* (A. G. Seiler Co., 1906), p. 173.

2. Brownell, W. A., "A Study of Supervised Study," Bureau of Educational Research Bulletin No. 26. University of Illinois, Bulletin No. 41, Vol. 22 (1925). Good summary of administratve devices.
3. Butterweck, J. S., "The Problem of Teaching High School Pupils How to Study," Teachers College Contribution to Education, No. 237 (1926), Teachers College Bureau of Publications.
4. Crawford, C. C., *The Technique of Study* (Houghton Mifflin Co., 1928).
5. Grant, J. R., *Acquiring Skill in Teaching* (Silver, Burdett & Co., 1922), pp. 131-135.
6. Hall-Quest, A. L., *Supervised Study* (Macmillan Co., 1916). Good comprehensive summary to 1916. Discussion of supervised study in the high-school subjects in second part. Inferences can be drawn for elementary procedure.
7. ———, *Supervised Study in the Elementary School* (Macmillan Co., 1924).
8. Headley, L. A., *How to Study in College* (Henry Holt & Co., 1926).
9. Holzinger, K. J., "Periodical Literature on Supervised Study During the Last Five Years," *Elementary School Journal*, Vol. 20, No. 2, October, 1919, pp. 146-154.
10. Kornhauser, A. W., *How to Study* (University of Chicago Press, 1924).
11. Lyman, R. L., *The Mind at Work* (Scott, Foresman & Co., 1924). Excellent.
12. McMurry, F. B., *How to Study and Teaching How to Study* (Houghton Mifflin Co., 1909). One of the best known discussions in the field, following Dewey's *How We Think*. Excellent on psychological factors, nothing on administration.
13. Miller, H. S., *Directed Study* (Charles Scribner's Sons, 1922).
14. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. xiii. A good summary of suggestions.
15. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920). Good summary in Ch. xvi.
16. Reeder, E. H., "A Method of Directing Children's Study of Geography," Teachers College Contributions to Education, No. 193 (1925), Teachers College Bureau of Publications.
17. Simpson, M. E., *Supervised Study in American History* (Macmillan Co., 1919). Concrete discussion of lessons in upper-grade history.
18. Thomas, F. W., *Training for Effective Study* (Houghton Mifflin Co., 1922).
19. Whipple, G. M., *How to Study Effectively* (Warwick & York, 1917). Unorganized but helpful set of rules.

20. Wilson, H. B., *Training Pupils to Study* (Warwick & York, 1917). Practical and specific discussion of factors in study, with concrete application to lessons.

Note: The periodical literature on supervised study is extremely valuable but so extensive that no adequate summary can be included here. Many very helpful discussions can be found by consulting the *Readers Guide* and the index summaries of bound volumes of educational journals.

PROBLEM 3

HOW MAY THE LABORATORY BE USED EFFICIENTLY?

Exploratory and Pre-Test Questions

None. Proceed to study of the text.

Definition of terms. It has become fashionable to use the term *laboratory method*, and attempts have been made to apply the term and method to every subject in the curriculum. It is hailed as a remedy for the old-fashioned *recitation method*. While the term *laboratory* can be applied to any and all types of workroom—library, classroom, study hall, conference room, etc.—it has had a narrower application historically. For the purposes of this volume, the traditional usage will be retained. The term will be applied to the scientific workrooms and practical shops, in which each pupil works with the materials and apparatus. There shall be included also consideration of lecture-demonstration procedure which is forging to the front as an approved technique in the laboratory subjects. The procedure will involve experimentation, or observation, or application by individuals or small groups dealing with actual materials.

For the newer modes of procedure in those subjects which are not true laboratory subjects, we already have a satisfactory term, namely, *supervised* or *directed study*. Miller's use of the term *directed study* is much more to the point than some other widely advertised *laboratory methods* in English, history, etc. It is always better to avoid the development of unnecessary terminology, particularly to avoid new terminology where satisfactory terms already exist. There can be, of course, genuine laboratory pro-

cedure in English, mathematics, etc., in terms of the definition above.

Aims of laboratory instruction. The laboratory should be used by students to further three types of learning, giving the pupil:

1. Information gained through experiment and observation
2. Skill in problem solving through experimentation
3. Skill in manipulating materials and apparatus

The laboratory is a device to give the students real experience, and properly used it is ideally fitted to achieve the aims listed. Certainly much interesting and valuable information is to be gained through observation of plants and animals, through dissection, drawing, and experimenting with simple problems. Given real problems, the laboratory is an ideal place in which to practice problem-solving skills. If students are required to set up their apparatus, and later perhaps to devise it, training should result in motor skill, valuable in further laboratory practice.

Failure to achieve these aims. While many scientists and teachers of science would probably deny it indignantly, the testimony of general educationists and the easily observable results justify the suggestion that laboratory instruction in average American schools does not achieve its aims, does not justify the time and money expended. Even among the more pedagogically trained teachers of science there seems to be growing doubt. Is laboratory instruction then useless? Shall it be removed from schools, particularly those concerned with general education? Certainly not. The laboratory can be used to achieve the desired results if proper methods are employed. An examination of the causes of present inefficiency may point the way to more worthy use.

Information. The chief difficulty here is not that no information is acquired but that the information is isolated, factual not functional, not related to real life. The remedy

lies partly in better method, but largely in better selection of subject matter. The movement toward an introductory *general science* course, and toward the inclusion of more everyday material and real-life problems in the later science courses, is a wholesome one. Effects are already observable. To the scientist who objects, reply should be made that we are here concerned with the *general* education of the average citizen. The average learner needs information related to life. Training in pure science is an equally important aim, but only for specialized groups of students. It can be cared for properly in later years.

Problem solving. The difficulty here is that laboratory procedure which should be, par excellence, problem solving, is as a matter of fact nothing of the sort. Students do not solve problems in any real sense, but follow routine directions. They usually verify rather than discover. Recipes, not problems, are set before them.

Manual skill. There is probably less difficulty here than with the other two aims. If certain difficult technical manipulations are avoided, if the teacher refrains from too minute domination, an adequate amount of practice in manipulation is doubtless achieved. This is a minor aim at best.

General principles of guidance. From the foregoing, certain general considerations are clear. Obviously much that has already been said about problem solving and supervised study could be repeated here. The teacher must be a skilled director of the problem-solving process and of study. After the problem has been developed and understood by the class, individuals will progress at varying rates. During this period much individual assistance will be necessary. Incidentally a laboratory teacher must be a good housekeeper or manager. Otherwise time and material will be wasted, and pupils trained in slovenly practices.

Material must be socially valuable. What can the

teacher do about this, since material is issued to her chiefly in courses of study, texts, and laboratory manuals? She can scrutinize all these to see if the content is related to the needs of everyday life, to see if she can reconstruct it in terms of life, if need be, and finally to see if opportunity and guidance are given for utilizing the real problems which may be brought in by students. A check list such as the following is of value:

SCORE CARD FOR EVALUATION OF GENERAL SCIENCE TEXTS

1. *Selection of subject matter.* *For perfect score...* **30**

a. Does subject matter cover minimum essentials based on environment, activities, and interests of pupils in my community?
b. Does it provide a body of very important supplementary material for strong classes?
c. Does it provide a body of additional material particularly fitted for this specific locality?
d. Is all the material socially worth while and does it lend itself to the accomplishment of the aims of secondary education?
e. Is subject matter adapted to the age and preparation of the pupils of the grade in which the subject is given in my school?

2. *Organization of the subject matter. For perfect score...* **20**

a. Is subject matter organized into a well connected course or is it chopped into unrelated or poorly related parts? [Is continuity good?]
b. Are parts or topics small enough to be handled and understood by the average pupil in the grade in which the subject is usually given?
c. Are topics uniformly organized so that pupils will not have to relearn how to deal with each new topic?
d. Are topics in good sequence as indicated by the following suggested principles governing sequence:
(1) easiest first, (2) most intimate first, (3) most fundamental first, (4) most important from standpoint of interpretative value first.
e. Are topics given proper stress (time and attention), as their importance would seem to demand, as determined by: (1) significance in the environment, (2) value in interpretation of subsequent subject matter, (3) interests of pupils, (4) teachability.

3. *Is the psychological organization of the book based on the learning process?* *For perfect score...* **10**

a. Are topics introduced in a manner that will challenge the attention and catch and hold the interest of the student? Is the topic "sold" to the student before the difficult part is presented?
b. Is the text written by a classroom teacher who has a broad knowledge of actual classroom problems?
c. Are questions thought-provoking or are they informational? Do they test the pupil's ability to think? His ability to remember facts?
d. Does the style of the book lend itself to the teaching of the scientific method?
e. Are topics supplemented by well selected practical applications which are put to the students as problems; (1) out of his environment, (2) capable of being solved, (3) well worth solving?

4. *Does the book provide information as to other sources of materials, bibliography, useful tables, index, table of contents, etc.* *For perfect score...* **10**

a. Are there lists of materials and supplies for laboratory use?
b. Are there lists of supplementary references?
c. Are there lists of additional projects? (These are generally at end of each topic or chapter.)
d. Are there directions for the preparation of materials, reagents, etc.?

5. *Is the book well illustrated?* *For perfect score...* **5**

a. Are there enough illustrations?
b. Are illustrations well distributed, or do most of them occur in the first part of the book?
c. Are illustrations good; (1) are they clear, (2) do they bring out the points desired, (3) do they challenge interest, (4) are they up-to-date?
d. Are there diagrams and charts to bring out information ordinarily brought out in this way?
e. Are there plenty of tables?

6. *Has provision been made for laboratory experiments and projects?* *For perfect score...* **5**

a. Are actual laboratory directions for experiments provided?
b. Are directions for carrying out projects provided?
c. Has laboratory work been well coördinated with the text, or do you find larger portion of laboratory work in first part and little in last?

d. Does laboratory work suggested require a large and well equipped laboratory or the average laboratory?

7. *Is the material character of the book adapted to the purpose for which it is intended?* *For perfect score...*

a. Is the book of proper dimensions?
b. Is it substantially bound? Test it.
c. Is the paper good; white, not glossy, too thin, nor too frail?
d. Is the printing good; type large enough, bold face for emphasis, all parts clear, spacing good?
e. Importance of material emphasized by type of printing?

8. *Is the book written in good, clear-cut, comprehensible English, that is in keeping with the age and preparation of the pupils?* *For perfect score...* 5

9. *Is the cost of the book in keeping with the cost of other texts of the same type, and with the make-up of the book?* *For perfect score...* 5

10. *Is the book adapted to the course of study in your school and the needs of your particular community?* *For perfect score...* 5

[1] *Total...*100

Problems must be real, interesting, and adapted to the learner's level. A science teacher once kept track of the problems brought in by his students over a period of years. From these he was able to construct, with the addition of other necessary material, a textbook in his science. It is widely used because it is interesting to the students and adapted to their level of understanding and ability. [Nearly half of the pre-test and summary questions on the learning process in this book were suggested by college and normal school students.] Even if it is not possible to find enough real problems in the life about one to carry on an entire course, most of the necessary material can be reconstructed and presented in terms of probable real problems, certainly in terms understood by the student and interesting to him. The more progressive science teachers agree to this,

[1] J. E. Frank, *How to Teach General Science* (P. Blakiston's Sons & Co., 1926), pp. 68-72.

as the following quotations indicate. Criticizing the common type of material available, Woodhull says:

> The high-school teachers of this country have their subject matter and method of treatment minutely prescribed for them by those who understand neither the subject nor the pupils as well as they do.
>
> Some persons, unconscious that physics is a living subject, that every man, woman, and child has his own physical world to study, varying with persons and localities, demand that these high-school pupils be fitted to the procrustean bed.[2]

The same author indicates the lines along which reform should proceed:

> If physics is to hold its own among the other high studies, more home work must be devised for it and it must absorb more of the daily attention of the pupil. When physics is made easy and interesting, there is often a large compensation in voluntary outside effort. Unless we are sure that we are sufficiently wise doctors in education to safely prescribe a dietary distasteful to the pupils, it would seem better to give them bread than a stone, because their appetites demand it. They receive more, they work over it more diligently, and they digest it better. We might let them have more of electricity and not compel them to take so much of mechanics. They might spend less time on electrical measurements and none at all on measurements from a battery cell. They might omit the calibration of a thermometer and "double weighing" with the balance.[3]

Speaking in similar vein, McMurry says:

> A child does not want the alphabet (that is, the simple principles) of science any more than he wants the names of the letters of the alphabet when learning to read. . . .
>
> There is another great advantage in teaching science where we find it in these centers of life's activity, and not in some isolated scientific form in laboratories or textbooks.

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[2] From J. F. Woodhull, *The Teaching of Science* (1918), p. 72. By the permission of The Macmillan Company, publishers.

[3] *Ibid.*, p. 26.

The child who draws his knowledge of science directly from life, under normal conditions, will not have much difficulty in finding it again in life and applying it to life. It is not difficult to so isolate the study of physics and chemistry from the usual conditions of life that the student in after years will have more difficulty in rediscovering his knowledge than he had in first acquiring it.[4]

Woodhull defends the implied revision of science courses toward more interesting real life content as follows:

Some reader has by this time queried whether our intention is to amuse and entertain the pupils and to relax their work. My purpose is to get more work and more intelligent work than we find now in our school laboratories. If the work is of absorbing and compelling interest, so much the better. I like to see high-school pupils work. They like to work. Three-quarters of all the pupils who enter the high schools of this country drop out during the course because they are tired of loafing and want to go to work. Give them something worth while to do and they will remain in school to work.[5]

As indicated above, problems must be real, laboratory instruction must avoid the mere following out of recipes. On this point Foster [6] says:

That verification is an essential in discovery is not questioned, but that it should be made the primary intellectual aim in the laboratory is believed to thwart the spirit of independent thought and scientific method. It virtually consists in telling the student that a certain thing is true, and then, assuming his incredulity, it orders him to see for himself. The truth is that students seldom think of challenging the statements of their teachers or textbooks, and hence the verification, as such, is to them usually perfunctory and superfluous. Doubtless the frequent employment of the lab-

[4] From C. A. McMurry, *Special Method in Elementary Science* (1904), pp. 30, 31. By the permission of The Macmillan Company, publishers.

[5] Woodhull, *op. cit.*, p. 119.

[6] H. H. Foster, *Principles of Teaching in Secondary Education* (Charles Scribner's Sons, 1921), p. 210.

oratory for verification rather than discovery is due to the greater convenience of its administration. It is far easier to familiarize the student with the facts in class, telling him by way of anticipation what to look for, than to lead him to discovery of the truth for himself; to work from classroom to the laboratory, rather than from laboratory to classroom.

Of course, both discovery and verification must be within the limits of the students' powers. The best teachers of science could probably not verify scientific laws in the best laboratories in the country unless given plenty of time. Certainly they could not discover anything of value. Experiments may still be used for illustration of laws when they aid the student in understanding and remembering.

Which leads to the suggestion that perhaps the lecture-demonstration method is better than the traditional method of individual experimentation—at least for some students and some parts of the course. Many years ago Thorndike [7] suggested that the time used by students in setting up individual apparatus and going through the motions of experimentation could better be used in reflective thought based upon observation. He points out that it is not scientific to spend two hours manipulating instruments, washing bottles and putting away test tubes when the result could be achieved in a few minutes through observation and thought. Recent research seems to justify this early suggestion and lecture demonstrations are coming to be more widely used in place of individual laboratory work. To those who stress participation, it should be pointed out that participation of the mind is participation, and often the most important part of participation. There should be anticipatory discussion, free questioning, repetition if necessary, and summary discussion accompanying demonstrations.

Suggestions for laboratory work. In the actual conduct of experiments, such as illustrating laws to help students

[7] E. L. Thorndike, *Education* (Macmillan Co., 1912), p. 178.

understand and remember, the use of manuals and certain techniques is valuable. The following suggestions by a science teacher [8] indicate an agreement with the general educationist:

Suggestions as to laboratory work. 1. The laboratory course should be designed to increase the pupil's interest in his work, to increase his power to *see, think,* and *do* for himself, and to make him acquainted with the chemicals, methods of manipulation, reactions, and laws at first hand.

2. Have the pupil keep a laboratory notebook, and insist on *the use of reasonably good English,* on *neatness,* and on *clearness,* and *that all entries shall be made when the experiment is performed.* Full directions, some explanations, and questions are useful in the laboratory manual, but strictly guiding subheads are to be avoided. A loose-leaf system is an advantage.

3. The attention of the teacher must be given repeatedly to each individual student while in the laboratory.

4. Some problems should accompany the course in chemistry. These problems should always be practical and should be made more of a laboratory than a classroom exercise.

5. Do not have much exact measurement. A student may measure a thing exactly and know nothing about it; in fact, his mind is easily diverted from the real problem to the mechanical details of the measurement. Some science courses have been aptly called "starvation courses in measurements."

6. Sacrifice some of the experiments in the book for some more nearly "homemade." The added interest will repay the trouble.

7. Make the student think, but do not expect him to rediscover chemical laws or to prove them. A little consideration of any law will probably show you that you could not, if turned loose in the best chemical laboratory in the country, prove the law in six months. Let the experiments illustrate the laws; they will help the student to remember and to understand them.

8. Sometimes the student gets more results than he can take care of. He may not select the one that you had in mind. Do not expect him always to draw your conclusion without your assistance from an experiment assigned by you.

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[8] J. E. Mills, *Chemistry,* in C. H. Johnson's *High School Education* (Charles Scribner's Sons, 1912), pp. 194-195.

Types of laboratory work may be distinguished. Further guidance may be obtained by differentiating between various types of laboratory work. Failure to distinguish, lumping all laboratory work together vaguely as *experimentation*, has contributed to some confusion. Three uses of the laboratory may be discerned, (1) experimentation, (2) observation, and (3) application.

In experimentation the aim is training in problem solving, with information and motor skill perhaps incidental. The emphasis is on discovery, original procedure, analysis, and solution of real problems. Routine verification of known facts, though often referred to as experimentation, is not the best meaning for the term. As indicated above, its educational results are limited and may even be detrimental.

Observational laboratory work may be of two kinds, (1) using museums, collections, exhibits, or watching lecture demonstrations, and (2) making field excursions. Here the informational aim is probably dominant, with problem solving secondary, though phases of the latter may be important in lecture demonstrations. In both types visual aids are freely used, supplemented by discussion, written report, and drawing. The pictures, films, specimens, etc., should be utilized as parts of thought movements and not merely "looked at." Excursions include trips to botanical gardens, industrial plants, places of geological interest, to civic departments and enterprises.

In the applications laboratory, known principles are utilized, but not for mere routine verification. The emphasis is upon using the principles to accomplish results worth while in themselves. Sometimes motor skill is more prominent than the application of principles. The best illustrations are in the laboratories of industrial art, household arts, some of the shops, etc.

Evaluation Exercise

1. Using the check list in this book, or any other found in the periodical literature and deemed to be satisfactory, evaluate a text in general science or in one of the high-school sciences. This may be in the form of a point by point evaluation or in the form of an organized paper summarizing your views on the text.

Observation Exercise for Problem 3

Inquire of the teacher before the observation begins, or, if that is not possible, try to discover as soon as possible the specific type of laboratory work—experimentation, observation, or application—being carried on during the particular hour.

1. If experimentation is going on:

a. Does it seem to be real experimentation or merely the routine verification of known results?
b. Does the general technique of problem solving (*see* observation outline for Problem 4, Unit III) seem to be in use?

2. If observation is going on:

a. Is the information being secured interesting and worth while in the everyday lives of the learners?
b. Is the general procedure of perceptual learning (*see* Problem 2, Unit III) being used? [*Note particularly* the conduct of excursions for observational purposes.]

3. If application is the aim:

a. Do the pupils seem to indicate mastery of the principles and motor skills necessary to carry out the exercise?
b. Does the teacher utilize the technique of supervised study when the learners seem weak on information or principle? The technique of sensori-motor learning if they are in difficulty with the motor skills involved?

4. Are the principles of good room management, good school housekeeping, apparent in the routine management of the pupils and in the handling of supplies and apparatus?

5. Are the notebooks an end or a means? Kept as a clear succinct account of what actually happens?

6. Are the notebooks themselves of such type as to give the pupil all the necessary assistance with mechanical items, but leaving him free to exercise initiative and ingenuity on those items demanding such traits?

Parallel Readings for Problem 3

1. Brownell, H. and Wade, F. B., *The Teaching of Science and The Science Teacher* (The Century Co., 1927).
2. Curtis, F. D., *Investigations in the Teaching of Science* (P. Blakiston's Son & Co., 1926).
3. Downing, E. R., *Teaching Science in the Schools* (University of Chicago Press, 1925).
4. Eikenberry, W. L., *The Teaching of General Science* (University of Chicago Press, 1922).
5. Greer, W. C., "The Teaching of Chemistry in Secondary Schools," *School Review,* Vol. 14, 1906, pp. 282-286. Good discussion of laboratory notebooks.
6. Kester, F. E., "Physics," chapter in Johnson's *High School Education* (Charles Scribner's Sons, 1912).
7. Lloyd, F. E., and Bigelow, M. A., *The Teaching of Biology* (Longmans, Green & Co., 1904).
8. Mann, C. R., *The Teaching of Physics* (Macmillan Co., 1912).
9. McMurry, C. A., *Special Method in Elementary Science* (Macmillan Co., 1904).
10. Mills, J. E., "Chemistry," chapter in Johnson's *High School Education* (Charles Scribner's Sons, 1912).
11. Pieper, C. J., and Beauchamp, W. L., *Teachers Guidebook for Everyday Problems in Science* (Scott, Foresman & Co., 1927). A manual, but containing much material of general value to teachers.
12. Trapton, G. H., *The Teaching of Science in Elementary Schools* (Houghton Mifflin Co., 1918).
13. Twiss, G. R., *A Textbook in the Principles of Science Teaching* (Macmillan Co., 1917).
14. Woodhull, J. F., *The Teaching of Science* (Macmillan Co., 1918). Excellent collection of essays and articles. A mine of information on the topic. Numerous quotations.

PROBLEM 4

HOW MAY BOOKS BE USED TO BEST ADVANTAGE?

Exploratory and Pre-Test Questions

None. Proceed to study of the text.

Place and importance of reading in furthering learning. As pointed out elsewhere, the use of books is one of the most important learning activities in and out of school. Contrary to popular opinion "book larnin" is extremely valuable. True, people of little ability can master books and parrot the contents, poor books are often written, teachers may misuse good books. But none of these things should blind one to the tremendous importance and value of learning from and through books. Except for people of very limited ability, and those engaged in routine occupations, most of what we know is derived from printed matter. In many school subjects, studying really means the use, in various ways, of reading material. Most reading is a mode of thinking.

Types of printed material available. Information derived in school through reading will come chiefly from textbooks, supplementary books, and periodicals. Less frequent use will doubtless be made of formal records, statistics, official documents, and the like. Out-of-school reading will involve, in addition, newspapers, news summaries, and various types of current report circulars and bulletins.

The importance of texts and supplementary volumes. Since books are to play so large a part, it is necessary to scrutinize them carefully. Check should be made of the material, its accuracy and value, mode of presentation, illustrations, vocabulary, and general adaptation to the learner. The standing, training, and experience of the au-

thor should be examined, as well as the standing of the publishers. Such mechanical features as size, binding, placement of pictures, type, etc., should be checked against accepted standards.

As we know, material destined for the learner's use must be interesting, understandable, and so constructed as to invite normal learning activities. Modern socially useful material should be organized so that key topics are amply treated. The old textbook was too often merely a *text* book which had to be amplified materially by the teacher or student. Thorndike long ago pointed out that, "there is no wisdom in the notion that a textbook is to give the subject matter of a course, but in so difficult a form that every teacher must illustrate and explain it at great length."[1] Unfortunately, many teachers are unable to illustrate and explain at great length. The books themselves often contain unteachable material. That is, matter which is factual, isolated, and unorganized. It cannot really be taught, because it does not mean anything. Many teachers struggle through it, however, forcing students to memorize many useless and unrelated, if not trivial, facts. Many more points could be enumerated, but time may be saved and clarity furthered by citing here a typical checking list purporting to embody the salient points of a good text. Further elaboration of many of these points as applied to specific books will be given you later in special-method courses.

The Checking List[2]

A. *General Considerations*

1. Do the training and educational experience of the author qualify him as an authority?

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[1] E. L. Thorndike, *Education* (The Macmillan Co., 1912), p. 163.

[2] F. W. Johnson, "A Checking List for the Selection of High-School Textbooks," *Teachers College Record,* Vol. 27, October, 1925, pp. 104-108.

2. Does the reputation of the publisher assure a dependable text?
3. Is the copyright of recent date?
4. Has the text a well defined point of view in accord with accepted educational aims?
5. Is the style clear, attractive, stimulating, and adapted to the age-level of pupils?

B. *Subject Matter*

1. Selection
   a. Is the subject matter of the text adapted to the needs of the community for which a text is to be chosen?
   b. Has the material been selected with due regard to the principle of relative values?
   c. Are there enough details, so chosen as to give meaning to the main topics?
   d. Is there an abundance of material from which selection may be made to meet the needs, capacities, and experiences of individuals and differentiated groups?

2. Organization
   a. Is the material organized with regard to the psychology of the pupil rather than to the logic of the subject?
   b. Is there an intensive treatment of a few main topics rather than an encyclopedic treatment of many?
   c. Is the arrangement of material cumulative in effect and yet independent enough to permit the omission of parts?
   d. Does the book as a whole give a unified impression?

C. *Helps and Aids to Instruction*

1. Does the teacher's preface explain the particular point of view of the author and give suggestions for the use of the text?
2. Is there an intimate and provocative introduction for pupils?
3. Is the table of contents full enough to show the outline of the book?
4. Is the index full and so arranged that the material may be easily found?
5. Does the glossary give the meaning and pronunciation of unusual and difficult words?
6. Does the appendix contain adequate drill material, tables, charts, etc.?

7. Are the illustrations, maps, sketches, etc., simple, clear, suitable, and attractive?
8. Are the references definite, annotated, evaluated, adapted to the pupils?
9. Are there pointed and thought-provoking summaries and reviews at the end of each unit?
10. Are there definite and varied study-helps?
11. Are there at the end of the book general reviews requiring thought and reorganization of subject matter?
12. Is there sufficient, interesting, and varied drill material in the chapters as well as in the appendix?

D. *Mechanical Make-Up*

1. Is the binding durable, flexible, pleasing?
2. Is the paper suitable for cuts as well as for reading without eyestrain?
3. Is the type clear, properly spaced, of a size that is easily read?
4. Is the material well arranged on the page, with distinct topical headings?
5. Is the whole make-up attractive?

Proper use by the teacher of texts and supplementary volumes. As the checking list indicates, the desirable book will set forth clearly its view and purpose, will contain problems, devices, tests, and other teaching material. An obligation rests on the teacher to understand the purpose and organization of a book before using it. Excellent books are often condemned by teacher and learner alike, because the teaching procedure was not adapted to the book. This applies to supplementary material, as well as to basic texts. Parker cites the misuse by many teachers of Thorndike's well-known and once widely used "Principles of Teaching." One-third of this volume is given over to problems designed to furnish two-thirds of the learning activity, but many teachers use the book as if the problems, vital to the correct use of the text, were not present. Thorndike [3] himself says:

[3] E. L. Thorndike, *op. cit.*, p. 166.

Many of the evils attributed to the overuse of textbooks are really due to misunderstanding and misuse of them. In the case of a good textbook there is a reason for every item and for its position in the whole. Too few teachers know the exact purpose of the textbooks they use. Too often a teacher uses a section of a book much as a savage might use a coat to cover his legs, or as a child uses a saw to cut a string, scissors to cut a board, and a padlock as a bracelet.

Poor books, when only such are available, must be supplemented by the teacher who will organize pre-tests, supplementary parallel materials, teaching and testing devices.

The fundamental reading habits. Reading depends upon (1) a certain basic attitude, and (2) upon certain basic habits, and (3) upon an adequate vocabulary.[4] The proper reading attitude may be taught by stimulating the child to look upon groups of words as representing ideas which he may secure by reading the words. That is, reading is thinking, not merely pronouncing words. He must not look upon groups of words as things to be pronounced, either one at a time, or together in varying degrees of rapidity. The basic reading habits are (*a*) recognition of a relatively broad unit or span, (*b*) recognizing this unit quickly and accurately, (*c*) regular recognition of series of these units progressively along a line, and (*d*) independent attack upon new and unknown words. Other items could be mentioned for oral reading, but we are here concerned with silent reading only.

The rate and development of the basic attitude, habits, and vocabulary depend very largely upon the methods used by the teacher. It is not the province of this general volume to discuss the detailed methods which are the con-

[4] G. T. Buswell, "Fundamental Reading Habits and Their Development," *Supplementary Educational Monographs,* University of Chicago School of Education, No. 21, June, 1922.

cern of later special-methods courses. Suffice it to say that the fundamental aspects of reading should be developed relatively early in the grades. They are the special concern of the lower-grade teacher. Special training in appropriate methods should be secured, or the teacher should have recourse to volumes devoted to the special problems involved.

However, many teachers on all levels and in all subjects involving reading, will find students who are handicapped in their general learning because of nonacquisition of the basic attitude and fundamental habits. Cases of reading deficiency may then become the concern of teachers on upper levels. Again, detailed treatment cannot be given in a volume devoted to general principles, but a few illustrations are in order.

Suspected absence of the proper reading attitude, or of deficiency in independent word recognition, can be detected by giving the student an oportunity to read orally. His general methods of procedure can be observed, and questions on content may be asked at the conclusion of the reading. This will usually suffice to show whether the student is reading or merely saying words. Deficiency in adequate vocabulary can be detected by vocabulary and comprehension tests, of which many are available. Deficiency in ability to recognize a broad span, to do it quickly, to recognize successive units in rhythmic progress across a page cannot surely be detected by ordinary observation. The eye movements must be observed, as they are reliable symptomatic evidence of the presence or absence of the inner perceptual process implied in rapid, regular recognition of relatively wide units of material. With a little practice, teachers can observe these movements closely enough for practical purposes.

The absence of the correct reading attitude is usually the result of early training based on uninteresting, too difficult, or otherwise nonmeaningful material. Reading ma-

terial which arouses no answering spark in the pupil's normal interests and activities, which answers none of his purposes, will not develop the desired attitude—that of looking upon reading as the key to meanings which may be either interesting and enjoyable, or valuable in the solution of problems. The remedy is obvious. Practice should be given in reading easy, interesting material, meaningful in terms of the normal purposes of the given pupils. The level of difficulty should be kept close to the pupil's ability, and should constantly call for progress on his part.

Vocabulary deficiency may be attacked by means of any number of games and devices. Wide reading of interesting, easily understood material is a good device. Other devices are, exercises in finding synonyms, selecting words in a passage which mean the same thing, locating an "out of place" word in prepared lists of similar words, matching words and meanings, cross-word puzzles (properly prepared for the purpose), etc.

Deficiency in one of the fundamental habits of rapid and regular recognition of relatively wide units, is usually to be corrected by the use of flash-card exercises of varying degrees of speed and difficulty. Giving much interesting reading somewhat below the level of the maturity involved is probably the best general device.

As indicated above, these are but a few illustrations to indicate the general nature of the problem. Special training should be secured, or the teacher should consult any of the several excellent volumes available which discuss the teaching of oral and silent reading.

The task of the elementary teacher is to develop the fundamental reading habits, and to initiate certain reading attitudes, that is, reading to understand, to remember, to enjoy, etc. The high-school teacher will find that many students promoted to the upper school have not made automatic the primary reading habits. Her task is thus two-

fold, first to supplement early training in mechanics, and second to train in those types of reading necessary on the adult level. We will now turn to these reading purposes.

Types of reading purpose. Even superficial analysis of one's own reading shows that *reading* is a blanket term covering a number of related but significantly different activities. The attitudes, purposes, and procedures of one and the same man are significantly different when he reads, for instance, the "funny paper," a novel, or a contract between himself and a building contractor. The scholar who reads all afternoon in his professional library and then turns in the evening to a popular magazine, reads with differing purposes and attitudes. Obviously the attitudes with which a learner approaches printed matter will determine in some measure what he does with it and gleans from it. Equally obvious is the fact that some training in reading for different purposes is valuable. What are the various types of reading purposes discernible? Allowing for natural overlap and combined use in some instances, the following tentative list is suggested:

A learner may read:
1. To remember
2. To understand
3. To gather further information, supplement the text, etc.
4. To evaluate critically a writer's statements, to compare critically two or more sources
5. To analyze the literary technique used
6. To enjoy

1. *Reading to remember.* This is the purpose most commonly associated with reading in school. As indicated in the discussion of supervised study, memorization is an important but not the sole aim of study. However, one does often read for purposes of later recall. This recall may be exact rote memory of words, or descriptive, logical memory of ideas in series. Memory is aided by understanding, but

often one may read to remember and be concerned only incidentally with understanding. It is the type of reading one does, not only to answer school questions, but to enable one to participate in everyday discussion.

2. *Reading to understand.* Here the learner reads to get meaning from the page. Stimulated by the suggestion of the material read, previous knowledge is recalled and aids in interpretation. The reader's effort is directed at "getting the idea"—clearly understanding the precise import of words, sentences, paragraphs. This type is illustrated in the reading of contracts, legal documents, insurance policies, directions for household appliances, etc. In school it applies to much text and supplementary reading when teaching procedure is good.

3. *Reading for further information, to supplement a treatment, etc.* Though couched in academic terms, this is also a common activity in everyday life. In school the topical contribution recitation necessitates much of this type of reading. It is related to reading for understanding but probably follows it in time sequence. Once a point is understood, an argument grasped, an exposition comprehended, the reader may and often must search widely for further information to confirm or deny the conclusion presented by the first contacts. To be sure, he must read understandingly, but understanding of the main point is now assumed. With the difficulties of initial analysis out of the way, the reader may peruse with great rapidity further similar material, gathering the relevant and rejecting the irrelevant in terms of the problem in hand.

4. *Reading to critically evaluate.* Again there is intimate relation to reading for understanding, and again understanding must first be achieved. The learner must proceed understandingly, but he is now chiefly concerned with the truth, validity, and accuracy of the statements as read and understood. We read to discover if a contract, well

understood, is legal and valid, if the description of an event is accurate, if the claims of a realtor or physician are in keeping with probability, sometimes even with possibility. The *primitive credulity* of mankind—his inability to criticize—is proverbial. His reverence for the printed word is used to advantage by every faker who can write and pay for advertising space. Training in reading to evaluate critically is of great importance in everyday life.

5. *Reading to analyze the literary technique utilized.* This purpose is not general in real life and should appear seldom in school work. Perhaps it should be confined to those classes especially interested in literary production and having special ability in that line. The reader here examines the literary devices used, their appropriateness and effectiveness, such mechanics of writing as spelling, grammatical construction, etc. This type might be classified as a subtype under reading for critical evaluation. It may be utilized sometimes in conjunction with reading for understanding. Technical analyses of structure—odd allusions, unusual forms—will often contribute to understanding. We may recall here the villager who could not understand the verse from Browning until the schoolmaster "grammafied" it for him.

6. *Reading to enjoy.* Just as reading to remember is commonly thought of in connection with school reading, so reading to enjoy is usually thought of when considering out-of-school leisure-time reading. Ordinarily the reader is not consciously concerned with remembering, subjects difficult to understand are avoided, and critical evaluation is often suspended, else fairy stories and much modern fiction would be ruled out. Sometimes enjoyment and supplementing thought go hand in hand. A few individuals derive enjoyment in reading for analysis of structure and technique. As elaborated elsewhere (Problem 5, Unit III), enjoyment may be of (1) mere sensory stimulation through

rhythm, rhyme, or use of words, (2) technical skill of the writer, (3) pleasant succession of thoughts, day dreams, reveries, happy memories, images stimulated by the words, (4) pseudo-emotional reaction.

Training is necessary in the various types of reading. There are three general reasons why training is necessary, (1) the various types of reading are necessary in everyday life, (2) they are relatively complex skills, and (3) each possesses certain inherent special difficulties.

1. *Reading to remember.* Difficulties confronting the learner here are sometimes due to instructors whose questions and methods give the student no specific guidance as to what to remember; or who put memory of all facts, major and minor, on a par. But even when the learner has some guidance in selecting, he usually does not know the devices which aid in reading to remember, such as underlining, organizing a list of sequential statements, preparing a brief summary or key paragraph, or making a formal outline. The pupil also needs to know the rules for economy of practice and drill.

Obviously part of the problem here is bound up with the ability of the teacher, rather than with the training of the pupil. The teacher must know what is worth remembering, and how to organize questions and teaching techniques that will direct the pupil naturally to this material and to methods of acquiring it. The teacher should:

1. Ask oral questions which can be answered by direct citation.
2. Ask written questions (the so-called *new* examinations) which require memory of facts for answering.
3. Ask questions, however, either oral or written which require memory of important key facts and not miscellaneous and fragmentary detail.
4. Discuss directly with the students the types of information which should be remembered exactly, remembered in general terms, not remembered except perhaps for the moment.

5. Suggest and illustrate the use of underlining key words and sentences as an aid in reading to remember.
6. Give practice in selecting key sentences, and in constructing them to cover given paragraphs.
7. Suggest and train in the use of outlines and summary devices.
8. Give practice in summarizing and outlining from memory.
9. Call attention to the rules for memorizing (*see* Problem 3, Unit III).

2. *Reading to understand.* Again it is to be noted that faulty technique in teaching is responsible for much learning difficulty. The common fault is to so teach as to emphasize memory of words rather than understanding of meaning. This actually prevents learning to read for understanding.

The pupil himself is often handicapped by (*a*) failure to acquire the fundamental reading habits, (*b*) lack of necessary ideas and meanings with which to understand, (*c*) insufficient vocabulary with which to handle his ideas and recognize what he reads, and (*d*) no opportunity to use the dictionary, make outlines, reread, discuss with others, analyzing, rearrange, etc.

Comprehension is seriously interfered with if the learner has not acquired easy command of the mechanics of reading. Presumably this has been acquired in the elementary school, but the high school will often have to give practice in developing still further these fundamental habits. Devices applicable here were presented in foregoing pages.

Since a learner's interpretation of what is seen, heard, read, depends on his store of knowledge, lack of experience, ideas, and meanings is a serious handicap. Lack of vocabulary is part of the same point. Parker [5] suggests that

[5] S. C. Parker, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923), p. 342.

ready recognition of the ten thousand words in Thorndike's *Teachers' Word Book* is sufficient. Monroe [6] asserts, however, that many high-school texts contain large numbers of words not included in the Thorndike List. Other research seems to confirm Monroe, showing that learners in general have considerable difficulty in reading and understanding the books given them as texts. Part of the difficulty is undoubtedly due to use of books which utilize diction and construction unfitted to the learner. Some of the material is so poorly done as to be unteachable. While the fundamental remedy lies in demanding better books, the immediate problem for the teacher is the development of a store of meanings and a vocabulary enabling the learner to read with understanding. The teacher should:

1. Make sure that the learner has:

a. The fundamental reading habits, so that mechanical difficulties do not interfere with comprehension. [Devices for training have been listed elsewhere.]
b. A store of meanings, ideas, background for interpreting what he reads. [Devices for developing these are set forth in Problem 2, Unit III.]
c. An adequate vocabulary.
   (1) Flash card drill.
   (2) Special attention to new and difficult words, writing on the board, explanation, use of dictionary, etc.
   (3) Much easy rapid reading.

2. Ask questions demanding, not repetition of words, but calling for personal illustrations, original paraphrasing, application of ideas to new illustrations.

3. Ask learner to select sentence containing key thought of paragraph or other unit.

4. Ask learner to construct headings or key sentences for given units.

5. Suggest and train in the use of logical outlines.

6. Give training in, and insist on use of dictionary, encyclopedia, yearbooks, and other references.

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[6] W. S. Monroe, *Directing Learning in the High School* (Doubleday, Page & Co., 1927), p. 204.

7. Suggest and illustrate the values of itemized analysis, rearrangement of sentences; ask questions which force the learner to proceed a step at a time from what he knows.

8. Suggest value of rereading after an interval.

9. Suggest value of, and provide opportunity for, free discussion and argument.

10. Ask the learner to prepare a set of test questions to cover the material.

11. Ask the learner to trace and interpret the author's thought, organization, plot, etc.

12. Ask the learner to prepare a brief explanation of the material to be presented to a given audience.

3. *Reading to gather information, to supplement, etc.* The chief difficulty here is that the learner often does not know where to go for his additional information; he is ignorant of sources. The first task of the teacher then is to train in the location and use of sources. This is a special matter which should be cared for in lessons given by the librarian or through the English department. It should not be the concern of the average teacher. However, if learners are untrained they must be aided by any and all teachers. Some high-school teachers turn students loose with an assignment and no library references, asserting that this forces the student to dig up his own references and thus learn how to do it. The facts are that there is serious waste of time, an unnecessary irritation, and an inadequate result. The learner will not be trained by such wasteful, haphazard methods which are usually the resort of lazy teachers. Teachers must provide definite library references and must see that the volumes are on reserve or otherwise available. However, if students have been trained to find and use sources they may then be held for the use of this skill by any teacher. High-school students should be trained somewhere to do simple bibliographic research. The teacher should:

1. Give training in the use of an index, table of contents.
2. Give training in the use of dictionaries, encyclopedias, atlases, statistical summaries, yearbooks, etc.
3. Give training in the use of a library catalogue, explain cataloguing and shelving.
4. Give training in the use of general periodical indexes, *i.e.*, the *Readers Guide* and the *Supplement* to it.

Once the student knows where to find material the teacher may attend to the real problem, training him to read selectively to supplement his store of information or to gather additional material for any purpose. The teacher should:

1. Assign reports on definite topics, problems, or expositions.
2. Supplement these topical assignments, or use independent lists of questions which call for relevant material, thus aiding in selection and rejection.
3. Ask for illustrations, anecdotes, stories, illustrating given points.
4. Give training in rapid skimming.
   a. Finding answers, sentences, statements under pressure.
5. Illustrate and train in the use of an outline as a skeleton to be filled in with selected relevant material.

4. *Reading to evaluate critically.* The chief difficulty here is the *primitive credulity* of the average individual. Critical ability seems to have been a late evolutionary development and not the common possession of all grades of intelligence. Even so, training is of some benefit. The second common difficulty is the lack of sufficient background of facts and principles on which to base intelligent evaluation. A third difficulty is that both life and the school tend to crush the critical ability. It is better to conform, not to question, as long as one is safe and comfortable. Granted some ability and an adequate background training can be given. The teacher should:

1. Present controversial questions and problems necessitating decision between two authors, two books, two bodies of data.
2. Ask students to locate similar as well as contradictory data.
3. Ask the student to recall his own experiences and observation to compare with the printed generalizations.
4. Point out, however, the poverty, limitations, and ease of misinterpretation attending one's own experiences.
5. Require discrimination in use and interpretation of words.
6. Call attention to and train in noting certain subsidiary points:

(1) Date of publication of material
(2) Author's name, position, and degrees
(3) General reputation of publishing house
(4) Use of footnotes and bibliography
(5) Author's general ability to write and organize

7. Give practice in constructing outlines, stressing proper placement of major and minor statements.

5. *Reading for technical analysis.* To do this type of reading requires considerable technical knowledge and some natural ability. Both are affected more by maturity, perhaps, than by training. Since this matter plays a very small part in general learning and is a particular problem for special-methods courses in English, detailed discussion will be omitted here. This type of reading will be furthered by:

1. Explicit attention to, and practice in recognizing various literary devices, figures of speech, etc.
2. Practice in comparing the styles used by various authors.
3. Practice in analyzing to determine how emphasis and effect are secured in given passages.

6. *Reading to enjoy.* The chief difficulties here are securing an adequate supply of enjoyable reading material, and securing opportunities in the school program for pure enjoyment reading. There is little difficulty with the learner, as he is exercising a normal activity. Again the matter is a concern of special-method courses in the teaching of literature. The teacher should:

1. See that an adequate supply of material is available.
2. Introduce students to it and provide for its use in such ways as to beget enjoyment. [See Problem 5, Unit III, for detailed discussion of general rules.]
3. Ask pupils to bring to class books which they have enjoyed, and to recommend them to others.
4. Provide opportunity for expression of enjoyment, orally or in writing.
5. Give explanations in advance for hard words, odd construction, or other items which might interrupt the free reading necessary for enjoyment.

Many of the concrete illustrations used in presenting principles governing the development of habits of enjoyment were taken from this field—training in reading for enjoyment. The discussion in Section 3, Problem 5, Unit III, should be consulted.

Parallel Readings for Problem 4

1. Buswell, G. T., "Fundamental Reading Habits and Their Development," *Supplementary Educational Monographs,* University of Chicago School of Education, No. 21, June, 1922.
2. Charters, W. W., *Methods of Teaching* (Row, Peterson Co., 1912), Ch. xvii.
3. Gates, A. I., *The Improvement of Reading* (Macmillan Co., 1927).
4. Judd, C. H., "Reading: Its Nature and Development," *Supplementary Educational Monographs,* University of Chicago School of Education, Vol. II, No. 4 (July, 1918).
5. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. vii.
6. Morrison, H. C., *Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Chs. xix, xx.
7. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. xvii.
8. ———, *Types of Elementary Teaching and Learning* (Ginn & Co., 1923), Chs. v, xi.
9. Stone, C. R., *Silent and Oral Reading* (Houghton Mifflin Co., 1926).

Note: Many other scientific monographs and discussions of special method are available in most libraries.

PROBLEM 5

HOW MAY ORGANIZATION AND EXPRESSION OF THOUGHT BE USED IN GENERAL LEARNING?

Exploratory and Pre-Test Questions

1. A student who did good work in English turned in science notebooks with numerous errors in sentence structure, grammar, and punctuation. When questioned by his teachers he said, "Well, that's in English but doesn't matter in science." Another student graded low for a poorly written and organized science notebook said, "Dis ain't no English class."

a. Should English be graded in other courses than English?
b. Could poor English conceivably interfere with learning in other courses? Does your answer here qualify in any way your answer to *a*?

2. A teacher got an excellent set of papers from a class on "How to Make Paper Gliders," and later a very poor set on "How the *Monroe Doctrine* Affects Mexico."

a. How do you account for the difference?
b. Will such trivial topics as the first be of any real value in education?

3. Be able to tell briefly but explicitly why you liked or disliked your "composition" or theme-writing classes.

4. Suppose that you were so placed that upon a given occasion you had to entertain a number of strangers—had to make conversation. How would you go about it? List a few rules to bear in mind making for success. [If you have had this experience, describe it.]

5. A speaker refusing to make a short talk was told, "But we only ask you to speak ten minutes—surely you can do that." He replied, "If you wanted me to speak an hour I could begin now, if a half-hour I would like a day's notice, but for ten minutes I must have at least a week." What inferences can be drawn?

6. Several speakers present phases of a topic. All are on the same theme and all are about equally prepared. The audience

listens to some with considerable attention, with others restlessness is noted. What are some reasons which might account for this? Do not stop with stock, blanket explanations.

Expressing one's knowledge serves three purposes, (1) communicating ideas or giving pleasure to another, (2) testing one's mastery of facts and principles, and (3) furthering general learning processes. We are here chiefly concerned with the third purpose.

Expression, oral, written, or through the plastic arts, is obviously important in conveying ideas to other people. As such it is, however, the concern of the fields of English, art, dramatics, etc., and details will be left to later special-methods courses. Expression as a matter of testing will be elaborated somewhat in a later discussion of the use of tests in directing instruction.

In addition, it is quite clear that organizing and expressing one's thought is a distinct aid to the learning process. To explain what one knows, has a distinctly clarifying effect on these very ideas. We may rightly suspect the student who says, "I really know but I cannot tell," and the one who concludes a long, pointless discussion with, "Well, you know what I mean." Insistence that these students tell exactly what they know or mean, will not only demonstrate whether they really know, but will certainly have a stimulating effect on their learning processes. To express clearly, one must first be sure of his facts, words, organization, etc.

Expression of ideas which are already fairly well clarified tends to make the association more permanent. Organizing for expression gives practice in many problem-solving skills, definition, search for data, critical evaluation, suspended judgment, etc. Giving expression to emotional reactions aids both in original learning and in acquiring habits. Expression contributes, therefore, to all the basic types of learning, sensori-motor, perceptual, memorizing, and prob-

lem solving. With this in mind we may consider the general principles governing the organization and expression of thought.

Forms of expression. The commonest form is, of course, verbal expression, either oral or written. Whenever one is conversing, explaining, arguing, pleading, making short talks, or more formal addresses, he is probably chiefly concerned with communicating ideas or giving pleasure to his hearers. Inevitably, however, he clarifies his own ideas and practices various mental skills, in other words—he learns. Similarly, with writing letters, outlines, reports, or requests, one both conveys thought and furthers his own learning.

While less prominent, drawing is a form of expression important for pleasure, communication, and learning. One's ideas are clarified by drawing diagrams, maps, pictures, sketching, etc. Other forms of expression are painting, dancing, sculpture, though we are less concerned with them in ordinary education.

Opportunities for using expression as a learning device. Expression as a device in furthering various types of learning has never had the recognition it deserves in school. Teachers have been busy with the major, direct purposes such as communication of ideas, giving pleasure, etc., and have not paid sufficient attention to the incidental effect on learning activity in general. Literary production has been the aim, often with students who lacked ability and desire. A modified technique, fitting expression to the needs and abilities of the students, would give valuable learning of various types. It is not solely a matter for the English department and the composition teacher. Contribution recitations in all content subjects are involved. Sand-table illustrations, construction projects, and dramatization are all to be utilized in various subjects. Science notebooks, both for experimental and observational work, afford an-

other opportunity to further learning as well as serve the immediate end.

All departments should combine in demanding good organization and expression of thought. It can be secured when made the concern of school policy. Doubtless, grades in science, mathematics, history, etc., should not be lowered for poor English expression unless the incoherence is such as to actually cast doubt on the student's knowledge of the subject. School policy should, however, demand a given ability in expression as a separate item and as a prerequisite for graduation. Good work in English classes alone should not fulfill this requirement. The student's ability should be scrutinized wherever displayed, and his grade in *expression* made dependent on consistent work in all subjects. The English teachers should coöperate with other teachers to attain this end.

General principles governing the organization and expression of thought. The following brief discussion of general principles will be illustrated chiefly from the field of oral and written expression, as these forms are the most widely used and contribute most to the various learning types. The same principles hold with a few special variations for other types of expression. A full discussion of all types is beyond the scope of this course and will be found in various special-method courses.

1. *Provide interesting, vital subjects.* One learns only when interested and attending. If pupils are forced to speak and write on topics foreign to their interests and activities, and beyond their understanding, they will neither communicate ideas nor clarify them to any extent.

While most progressive schools avoid them, many of us can remember the typical "composition" topics, "Honesty is the Best Policy," "Virtue is its Own Reward," "The Beauties of True Friendship," "The Historical Element in Evangeline." A young normal student was asked to write

on "The Religious Element in 'The Ancient Mariner.'" The assignment robbed his days of pleasure and his nights of repose. He toiled and perspired. Despite the theme, the attitude engendered was anything but reverent. The effort came back bleeding red ink from every paragraph. In conference he was told conclusively and firmly—although in kindly manner—that he could neither gather material nor present it coherently when he had it. Even simple matters of diction were beyond him. As a writer he stood at the foot! Fortunately for the instructor's peace of mind, he did not know that the student was earning his way through college largely by writing. Three days before, he had received from a newspaper syndicate a check, larger than the instructor's monthly salary, for an article describing the experiences of a party of scientists and tourists whom he had assisted in taking into an almost inaccessible sea-lion cave on the Oregon coast. The instructor was a scholarly man and an earnest teacher. What was the trouble? Disregarding the different aims and standards of literature and journalism, it is clear that the incident illustrates an important point. Given topics in which they are not interested, on which they have no information, and which no one wishes to hear about anyway, students will put forth no real effort of an educative sort. Given topics intimately related to their own lives, interesting in themselves, and about which others are eager to hear, there is likely to result vivid, convincing expression. The student seeks material, discriminates between words, makes sure he really knows, organizes so that the story is sequential; he learns a lot of things while preparing to express himself to others.

The inference is plain. Topics for expression should be simple, related to the learner's experience, and of value to readers or listeners. Otherwise, the student does not engage in vigorous self-activity. He may even copy material

from others. Suitable topics are to be found in (*a*) features of everyday interest indicated by newspaper and magazine content, (*b*) the student's school activities, athletics, dramatics, school government, club work, etc., (*c*) the student's leisure-time activities, pleasures, hobbies, etc., and (*d*) in the student's serious undertakings, plans for the future, etc. Among modern topics are to be found:

"A Short School Day with Home Study *versus* a Long School Day with No Home Study," "Shall We Adopt the Honor System in Our School," "How I Built My First Radio Set," "How to Make a Figure 4 Trap," "What I Got Out of Our Trip to ———," "Why I Sympathize with the Miners (or the Operators) in the Local Coal Strike," "Why I Plan to Study Medicine," "The Advantages of a College Education," "An Exciting Experience." [See Exercise 1.]

English teachers often object that such topics lack vitality. As a matter of fact they possess vitality and lack, perhaps, certain traditional literary earmarks.

2. *Provide adequate relevant material.* All three purposes of expression depend upon having something to express. An intriguing topic is not enough. One's experience must often be supplemented. The elements involved are (*a*) a clearly defined topic, (*b*) an independent search for material, (*c*) selection of relevant material. The first has been discussed in the immediately preceding paragraphs, and also in the earlier discussion of defining the problem (Problem 4, Unit III.) The two latter points were adequately presented under "Reading for Information or for Supplementary Material" (Problem 4, Unit IV). Repetition is unnecessary.

3. *Provide an audience situation.* Feeling that one has an audience not only motivates expression, but serves our particular purpose here—furthering the general learning process. With audience in mind, the writer or speaker must make sure he has his facts correctly; he must choose

both words and mode of presentation. He analyzes and judges facts, illustrations, anecdotes, etc. He learns how to appeal to various types of people, to induce rational or emotional response. This point is the complement of the first one in this section. Interesting, vital topics must be such not only for the writer or speaker, but also for the audience. Students will not speak or write well, will not search for data, analyze, or organize very much unless the material is of some use to some one. Here lies the reason for much pointless, listless, valueless reciting, speaking, reporting in the classroom. It is not only absurd but psychologically reprehensible to ask students to recite, read, or report material already well-known to all others in the group. The old quiz-recitation—a relic of monitorial days—should disappear before modern procedures which make class periods a time for analytic, critical discussion of new data.

On this general point, Morrison[1] says:

> Now much depends upon the pupil's attitude toward and his conception of the written paper. If he looks upon it simply as a task to be performed with the minimum of effort which will satisfy the teacher, then the writing will serve no useful educational purpose. Hence the pupils should be indoctrinated with the notion that they are writing papers designed to enlighten and convince others. The devices which the teacher uses for the establishment of this attitude are of course many, and they will depend for their effectiveness upon the teacher's clear conception of the purpose which the paper is intended to serve and upon his ingenuity and resourcefulness.

4. *Provide training in organization of material.* At this point, the fruitful combination of oral and written work is to be seen. Much expression will be oral but should involve some written preparation. While many difficulties

[1] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), p. 312.

disappear when the student has an interesting topic on which he is informed and an appreciative audience, all difficulties are not thus removed. The best informed and most fluent speaker is aided by preliminary formal organization of the material, except possibly the orator who rarely depends on facts or logic to attain his ends. The preparation of outlines and briefs is excellent general training, exercising several problem-solving skills. Though a mechanical aid, an outline or brief contributes to thinking, first by necessitating thinking in construction, and second by making it easier to detect illogical arrangement of ideas, lack of data, etc. In addition, the use of outlines and briefs is an important skill of value in everyday affairs. The ability to use them makes unnecessary the laborious preparation of complete papers.

The proper use of these mechanical aids is, however, a serious problem. We may recall the student who said, "How can I write what I want to when I have to think of the outline all the time." Many enthusiasts talk much of "inspiration," "spontaneity," and decry as unworthy of artistic expression outlines, briefs, rough drafts, tinkering, etc. Most of these enthusiasts have never done any writing. It is the unusual genius who "dashes things off" in final form. The original manuscripts of the greatest writers show much evidence of revision, erasure, substitution, changed order, second thought, endless tinkering. The question for the teacher is—how preserve the fresh spontaneity of a free flow of language and still get coherence and organization?

The answer is relatively simple, but one which the traditional teacher shudders over—permit, examine, and aid rough drafting, developing later the finished product. The teacher has too often insisted on the final edition first, and has not been interested in the struggles of the student to achieve this end.

The student should be encouraged to prepare very rough sketchy preliminaries, usually based on what he knows to begin with. Let him get down his own fresh vigorous statements any way he wishes, let him "get it off his mind." With these thoughts recorded, the duller task of supplementing and organizing can be taken up without damage to Pegasus' wings. A good portion of the teacher's time should be given over to training in, and discussion of, these rough outlines. They represent thinking and learning in the raw. The neatly typed finished outline is of less moment for learning—better as a test of learning. It may be interesting at this time to differentiate clearly between an outline and a brief. Monroe's [2] discussion is excellent:

> Although it is usually desirable for a writer to prepare a somewhat detailed outline in written form, this should be followed by a brief. An outline usually consists of separate words or short phrases which announce the topics or points that will be taken up in the report. For example, in an outline of a description of a city one would probably use such words as location, size, elevation, manufacturing, parks, schools, etc. These words do not express any information about the city in question. When used in an outline, "location" simply means that something will be said about the location of this city but gives no indication of what this will be. Similarly the other terms given above function merely to announce that the maker of the outline expects to say something on each of the points.
>
> A brief is made up of statements which epitomize the principal items of knowledge being organized. It is not necessary that these statements be complete sentences but each one must express, at least in abbreviated form, an item of knowledge. A brief, therefore, fulfills a more comprehensive function than an outline. The making of a brief forces one to think more clearly and more completely about the topic than the making of an outline. In fact, one may make an outline without clearly understanding the knowledge which it is intended to represent. To put it somewhat more bluntly, a student may make a satisfactory outline for

[2] W. S. Monroe, *Directing Learning in the High School* (Doubleday, Page & Co., 1927), pp. 291-293.

a report on a topic without knowing very much about it. This cannot happen in the case of a brief because the statements which appear epitomize the discussion of the topic. Hence, an important function of a brief is that in making it a student is forced to have clearly in mind the knowledge he is organizing. An outline may be made as a preliminary step in making a brief, but it should not be considered as taking the place of a brief. It represents a much lower order of thinking than the latter.

An illustration showing the difference between an outline and the corresponding brief on the topic, "Written Expression as a Type of Learning," is given below.

The Outline

I. Relation of organization of ideas to textbook reading
II. Relation of expression of ideas to learning
III. Clear thinking and expression of ideas
IV. The brief compared with an outline
V. Making a brief
   (*a*) Principal points
   (*b*) Subordinate points
   (*c*) Revision

The Brief

I. Organization of ideas supplements the learning resulting from the reading of a textbook.
II. Expression of ideas is an important learning activity.
III. Clear thinking is a prerequisite for effective expression. When one has clear ideas it is usually easy to express them.
IV. A brief differs from an outline in that it consists of phrases or sentences which express ideas instead of merely words or phrases that announce topics about which something will be said.
V. The steps in making a brief are:
   (*a*) Clearly define your purpose.
   (*b*) Formulate the principal and subordinate points of the discussion in complete sentences.
   (*c*) Organize these so that they will present a satisfactory trend of thought.
   (*d*) Test each statement for precision and for its relation to the problem being considered and make whatever changes seem desirable.

5. *Provide training in formal grammar and rhetoric, vocabulary, punctuation, etc.* This is the task of special teachers of English, and discussion must wait upon later special-method courses.

Discussion Questions for Summarizing and Testing on Problem 5

1. Find lists of suggested theme topics in modern books on composition. Evaluate the individual titles in the light of this chapter.

2. A student having great difficulty in speaking before a class was advised by her instructor to practice frequently before the mirror. List the values and weaknesses of this procedure.

3. A student is found using slang so constantly, relying upon it to such an extent that when deprived of it she could no longer express herself. What should the teacher do?

4. Students often say, "I have to follow the outline so closely I cannot say what I want to," or, "I have to be so careful to get the main idea that I forget what it's all about." Some teachers say, "I never have students write a brief, it spoils their writing."

a. What is the real difficulty here?
b. How would you proceed?

5. After a talk by a student on "How to develop films," students began a rapid fire of such questions as, "What is a fixing bath?" "What is hypo?" "What is metol?" Etc.

a. What was the trouble?
b. How could it have been avoided?

6. In many classes the same errors in oral and written composition are corrected over and over again during a period, during a term. What is the difficulty and how would you proceed?

7. We see many advertisements for various books which will supply one with a ready fire of small talk and entertaining conversation. Do you think the advertising claims are justified wholly, partially, not at all?

8. Most lecturers prefer large audiences—why?

9. During an English composition class, a paper stimulated considerable discussion. Many questions were asked, but finally, when a boy asked, "How many revolutions does an airplane propeller make per minute?" The teacher replied, "This is not an aviation class."

a. Was she justified in thus bringing them back to the point?
b. How else might she have proceeded?

10. A certain class in written composition is given much work in pantomime. Is this valuable for expression? For general learning?

Parallel Readings for Problem 5

1. Foster, H. H., *Principles of Teaching in Secondary Education* (Charles Scribner's Sons, 1921), Ch. x.
2. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Ch. ix.
3. Morrison, H. C., *Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Chs. xvii, xxiv, xxvi.
4. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1920), Ch. xi.

UNIT V

THE TEACHER'S GENERAL ACTIVITIES

The preceding units have outlined the nature of learning and the chief factors in its direction. So far, effort has been made to keep the discussion centered around the pupil's activity. The desirable directional activity on the part of the teacher has been related to the various learning activities as the discussion proceeded. There are, however, certain general activities which the teacher performs that may be discussed to better advantage directly in terms of teacher procedure. The criterion of efficiency for these activities is still, of course, the learning process of the pupil.

This unit will present briefly the principles and procedures used in making assignments, asking questions, using tests for instructional purposes, giving marks, and planning lessons and large units.

PROBLEM 1

WHAT ARE THE CHARACTERISTICS OF A GOOD ASSIGNMENT?

Exploratory and Pre-Test Questions

None. Proceed directly to the study of the text.

A fourth-grade youngster once said to his parents: "I like school this year, Miss A . . . . . gives us so many things to do. Last year Miss M . . . . . just said, 'Open your books and go to work!' " The two teachers mentioned represent two of the many classes into which teachers fall in regard to assigning lessons. The common idea of the assignment, still too prevalent, is represented by the teacher who, just as the bell rings, says hurriedly, "Work the list of problems of page 76," or "Take the next six pages for to-morrow." This is not assigning a lesson. It is telling the class where the lesson is, but not what to do with it nor how to do it. Even when practice is better than that, as it is in many cases, the idea still prevails that an assignment has to do with the textbook. A better idea is set forth in Earhart: [1]

> [The assignment] may be the acquiring of knowledge from some source, whether from books, people, observation, or reflection. It may be the collection of materials for an object lesson. It may be the application of principles, as in geometry, arithmetic, or grammar. It may be a private drill exercise in spelling, multiplication tables, penmanship, oral reading, music, or sewing, or some other subject which requires practice to insure skill. It may be the performing of certain exercises to correct physical defects or to assist physical development, as bending, stretching,

[1] L. B. Earhart, *Types of Teaching* (Houghton Mifflin Co., 1915), pp. 80-81.

and drawing deep breaths. Any teaching which involves work outside of the class period must evidently require an assignment; hence to limit the discussion to textbook lessons is to treat the subject too narrowly. The assignment may be a part of an inductive or deductive exercise, an object lesson, a drill lesson, a review lesson, or any form of class exercise which conforms to the conditions above stated.

Obviously the type of work done will be strongly influenced by the nature of assignments made. As stated elsewhere, an assignment must coincide with a real need or purpose in the learner, or it must arouse such a purpose. In keeping with the general theory of learning and teaching advanced in this volume, assignments of the "ground-to-be-covered" type are taboo.

Assignments, whenever possible, should be problematic, attractive, definite, concrete, and relatively simple and brief. Most of these characteristics are self-explanatory. A caution may be advanced in regard to *definiteness*. The assignment is always, or should be always, very definite in the teacher's mind. That is no guarantee that it is in any way definite in the learner's mind. What may be entirely clear and simple to the adult mind formulating and pronouncing an assignment may be quite difficult to the immature student attempting to grasp it. Which reëmphasizes the necessity for planning assignments which grow naturally out of the activities and purposes of the pupils. A second caution applies to beginning teachers who tend to assign too much or too little.

The assignment in lessons involving reflective thought. In any lesson, as has already been pointed out, the start, the introduction, the purpose leading up to the pupil's aim is of great importance. Often the aim is the excuse for an assignment of the traditional type. On the other hand, a lesson often proceeds forthwith upon statement of the aim with no traditional assignment or study period.

In the one case, there may be a discussion of sources of information bearing upon the problem, of methods of organizing data, of difficulties to be met, etc. The aim may be broken up into smaller units, and these units assigned to individuals or groups for report. After thorough discussion of the problem and methods of attack, the class studies as usual at their seats, at home, or in the library. In this case, the introduction is of the nature of the traditional assignment.

In the other case, upon statement of the aim, the class starts immediately to work upon the problem under the guidance of the teacher, or somewhat independently as a group. There may be discussion and use of sources as part of the class work, or material already in the possession of the students may be developed and organized. Thus the teacher is guiding what may be called a supervised-study procedure, directing the individual efforts of students, using the so-called *developmental method* of presentation. When this type of procedure is followed, the traditional *assignment* is not present. What is to be done and how to do it, is worked out as part of the coherent lesson procedure.

A point rises here which is a source of considerable confusion for beginning teachers, or for older ones who have not fully broken away from textbook teaching, formal assignments, and traditional quiz-recitations. "How do you use the textbook if you teach according to this method?" The answer would seem to be that we must first break away from teaching dominated by one text, and organize teaching which utilizes as many texts as are needed to carry out purposes broader than mastery of mere text material. But books will be used as major vehicles in much learning. The teacher must have the aim and objectives in mind, must know the text and other learning material available, and then must look around for a connection between these and the pupil's everyday experiences

and interests. Basing the preparation, or setting of the stage, or "purposing" on some concrete experience or real interest, she must then lead up to the more formal material which the school uses. Sometimes it is very difficult to find a connection, sometimes it may seem a little far-fetched to the casual observer. Often material must be studied in a different order or form from that in textbooks. The text material then is introduced with the aim or assignment when pupils are ready and want to use it. Study of the traditional type may follow, or the text may be used immediately in the classroom. Ideally, many texts and reference books should be used. A detailed presentation of the use of books and learning through reading will be found in Problem 4, Unit IV.

A fairly certain index of a teacher's skill is her ability to make smooth connections between pupil interests and purposes and learning material, which is but another way of stating the teacher's task in initiating learning: arousing interest, recalling old knowledge, and developing an aim or purpose. Sometimes all three purposes can be served by encouraging an argument that will lead to the statement of an aim, the solution of which promises to settle an argument. After the principal problem has been stated, considerable discussion might ensue regarding the data that would have to be gathered and their sources. A half-dozen minor assignments in the nature of individual or group problems might have to be made, later leading to a contribution or socialized recitation. In such cases there is much valuable pupil participation, not only in finding the aim or problem, but also in suggesting ways and means to solve it.

Examples. During the war, an upper-grade class studying the geography of their own state, Oregon, were led into a discussion of Hoover's call to save food. Meat substitutes were discussed and fish mentioned. The question was asked

whether Oregon, by substituting, could contribute anything to the food-saving movement. The salmon fisheries of the Columbia River were mentioned, but discussion revealed the fact that no one knew exactly how the fish were caught and canned. Hatcheries, fights between officers and illegal netters, etc., were mentioned by different pupils. An aim was quickly set up, "Let us see how the salmon fisheries of the Columbia River are carried on." The class then worked out a list of things they would have to investigate. Individual and group assignments included the following: "How the fish are caught," "How they are prepared for the cannery," "How they are put in the cans," "How the hatchery at Bonneville is operated." These are but a few samples of the topics studied. The class gathered pictures, bulletins, magazines—in all a remarkable amount of information. One boy discovered that a student in the high school had lived on the Columbia and suggested that he be asked to visit the class and tell what he had seen. Another boy found in the library Jordan's *Life of a Salmon,* and the teacher herself gained some valuable information from it.

A similar lesson during the war resulted in several assignments that necessitated the gathering of data from all sources, and involved considerable correspondence. It had for its aim, "How the American Red Cross is carrying on its work."

The local history of a region is a good opportunity for a real assignment lesson. Making a poster or set of posters to illustrate the products of a group of states, or to illustrate the phases of an industry, will also involve the assignment of a number of sources and provide for individual and varied work. The class can often participate in outlining sources, and the teacher should refer them to others she has prepared in advance. In many of the assignments of the type here discussed, there will be a definite outline of topics and subtopics. Again an opportunity for pupil participa-

tion is afforded, though in some cases mimeographed outlines should be passed out after the class have opened the topic as far as they can.

An interesting example illustrating the development of an assignment is presented:

AN ASSIGNMENT LESSON

Subject Matter

Teacher's aim

General. To teach the history of Oregon

Specific. To introduce this study by a discussion of local history

Analysis of the aim

Old knowledge. The class has a general background of history from stories and elementary history texts. The fact that they know nothing of local history will be brought before them and the need for it emphasized. The further fact that much history will be lost unless some one soon gathers it from the pioneers and writes it down should be mentioned. The class will recall that in studying the first settlements in this country, the following points usually came in for discussion:

When and by whom settled
For what reason
Why that particular place was chosen
How it received its name
Character of the settlers
Troubles with Indians
Early events in the settlement
Growth and development

New knowledge. Omitted here to save space, and because it is fully indicated in the assignments made.

Sources and references

Indicated in assignments.

Method

"In our history work we have studied things about what countries? [*Egypt, Greece, Rome, England, United States,* etc.] What things do you know about the history of Oregon? [Let

them tell any interesting stories they may know.] What do you know of the history of this country, or of our own city here? [Very little is usually known.]

Pupil's Aim. "We are going to find out how Roseburg was settled. Where might we look for information? [*Documents at courthouse. Letters of people who were here.*] Yes, but both sources are limited. Where else should we look? [*We might ask the old people who have been here since the beginning, or for nearly that long.*] Yes, that is the best source of all. Does any one see another reason for getting this information from the pioneers? [*It will soon be lost if we do not get it and write it down.*]

"What things shall we ask them? [A great number of suggestions are made.] Let us see if we cannot organize all these points into an outline that will make our work easier. Who recalls other lessons we have had that will help us in carrying on this study? [May have to develop a little but class will recall the study of the early colonies, and will organize the outline on the board that is given under *Old Knowledge* above.]

"Now about Roseburg, when was it founded? By whom? [Some of the class know Mr. Aaron Rose but do not know the date of settlement.] Knowing Mr. Rose, we might infer the answer to one point in our outline. [*That the town was named for him.*] That is true, but many people think that it was named because of the great number of wild roses found growing here.

"Before white men came, who was living here? [*The Umpqua Indians.*] Yes, the river was named for them. What will we want to know about them? [*Were they hostile? How many were there? Were there any battles near here?*] [Assignments are made as the lesson progresses. See list below.]

"Do you think that Roseburg was founded for any of the reasons that the early colonies were? [Probably not.] Let us find out, then, why people located here. When people choose a place for a home, they are usually impressed favorably. Shall we gather some first impressions? [Make assignments.] I know of one story that I will tell you now. In the spring of 1850, Mr. M. E. Moore, who now lives at the corner of Rose and Washington Streets, passed through this part of the country. He was traveling with three other men on horseback from Oregon City to the California gold fields. As they reached the hill, now called Reservoir Hill, they stopped to look at the valley a short distance below. It was thickly dotted with large oak trees and grass was growing waist-high beneath them. All four men realized the

beauty of the spot, but Mr. Moore was particularly impressed and exclaimed, 'Boys, I'm coming back here some day to make my home.' At this time there was but one settler, a hunter, who had erected a cabin. Three years later Mr. Moore returned, and this time found Mr. Rose and his family here and a settlement springing up. I will not tell you any more about this but there are many more interesting things connected with it. In 1858 Mr. Moore erected the house in which he now lives. Would you not like to hear him tell about it?"

[The following assignments were developed in like manner.]

1. When, why, and by whom was Roseburg founded? [See Mrs. Rose, daughter-in-law of Aaron Rose.]
2. Indians of the vicinity and trouble with them. [See Judge Fullerton.]
3. The character of the early settlers. [Mr. Stanton.]
4. First impressions or first things noticed. [Mrs. Lane.]
5. Early happenings in the settlement. [Any of several pioneers.]
6. The first hotel and why it became so well known. [Mr. Moore.]
7. Why Roseburg became the county seat instead of Winchester, and how the early government was carried on. [Mr. Buchanan.]
8. Men or women prominent in state affairs. [Mrs. Lane.]
9. The first business structures. The first brick buildings, etc., and where they stood. [Mr. Aiken.]
10. The first homes. [Mrs. Rose.]
11. The first post office and the early mail service. [Mr. Stanton.]
12. How seed corn was first brought to this part of the country. [Mr. Moore.]
13. Early methods of communication and transportation.
14. The coming of the railroad.

The topics were given to individual pupils or committees. A few alert pupils volunteered to find and bring in other facts by consulting other sources than those mentioned.

This is a very simple illustration of a detailed assignment. Obviously the same type of technique would be involved if extensive consultation of books, and museums, in addition to people, was necessary. Few difficulties would probably be presented in pursuing these assignments, but in some cases the class will have to discuss how to approach

certain officials or noted persons. Considerable correspondence may be necessary. The kind and amount of notes to be taken should be discussed.

It should be noted here that even in simple assignments the teacher should discuss the coming lesson, indicating the important points, preparing for certain difficulties that will be met, etc.

The further development of such a lesson as the one illustrated is quite obvious. Excellent motivation is afforded for expression lessons when individual reports are made. The material will then have to be organized in class and socialized recitations can be used. Illustrations should be gathered and a booklet written, different chapters to be done by committees from the class. The printing of such a booklet would be a very worth while outcome for such a series of lessons.[2]

The assignment will also prepare for difficulties the pupils may meet in their independent work. Hard words, idiomatic phrases, and other linguistic difficulties should be explained. Lists of study questions may be passed out in mimeographed form that will materially aid the pupil in searching for information and organizing it for presentation in class. Each assignment cannot stop, of course, to clear up all difficulties; it cannot even indicate all possible sources of information in some cases. But the pupil should master, by means of a series of properly made assignments, the use of dictionaries, encyclopedias, supplementary books, tables of contents, indexes, marginal headings, graphs, charts, pictures, etc. Intelligent use of such mechanical details will clear up many study difficulties. The pupil should also acquire the ability to outline properly and to discriminate between facts in the making of the outline; to know when

[2] Other similar ones may be found in Wilson, Kyte, and Lull, *op. cit.*, Ch. iv. *See also* J. R. Grant, *Acquiring Skill in Teaching*, pp. 139-143.

to read all of an article or chapter and when to read rapidly, skipping detail. He should learn to find other sources than those given him, and to make intelligent comparisons. These things are all elements in the study process and have been discussed in detail by themselves, but it is to be emphasized here that proper assignments must take them into account. Closely related to outlining is the process of taking notes, few of which should be called for. It is usually better to advise pupils to underline their own textbooks, rather than to make notes from them.

The assignment in lessons involving the acquisition of associations and skills. In this type of lesson there is rarely an elaborate assignment, rather an introduction. The task of the teacher is to so manipulate the situation that pupils feel the need of the association or skill and demand its acquisition. Teaching procedures and resultant learning procedures must be such as to present frequent demands on the pupil for new and desirable associations and skills. Introductions to these lessons will then care for this point and for a second point elaborated elsewhere, getting the model clearly before the class. In the teacher's preparation there should be attention, also, to supply of materials and tools needed.

Where should the assignment be placed in the lesson period? As the preceding discussion makes clear, the assignment more often comes at the first of the period than at the last. However, after a topic has been outlined and is in full swing, the work may progress at varying speeds for the different parts, making it necessary for the teacher to take the last few minutes to sum up what has been done, and to refocus attention on what is to be done during the next study period. When the work progresses evenly, or when the next day's work does not depend in any way upon the present discussion, the assignment should come at the first. In the case of drill problems in arithmetic,

spelling, etc., the assignment should also come first. In either case, however, sufficient time must be allowed. Assignments may take ten minutes or they may take two thirty-minute periods, depending on the subject, grade, and type of pupils. Especially, when the assignment does come at the end of the period, the teacher must avoid being caught with too little time at her disposal. Such an outcome necessitates a hurried, unorganized assignment, which is detrimental to work and unfair to the pupils.

The most skillful assignments are those made in answer to a question that arises during a lesson. The teacher should try to manipulate the situation so that such questions will arise, a procedure that can be used very successfully in content subjects such as history and geography. This point is well summmarized in Earhart: [3]

> It frequently happens that the questions which constitute the problems to be solved in the new lesson are raised during the course of some lesson a day or more in advance of the period when the subject is to be discussed in class. When not too remote from the day of recitation, it is worth while to make the assignment when the questions are raised, even if it interrupts the lesson for a few minutes. The motive is in the proper setting then, and the new lesson will be all the better prepared on that account. If the assignment keeps thus cropping out during the course of an exercise or several exercises, there should be a definite restatement of it as a whole before the study period, so that all pupils may know just what they are to do and how they are to do it.

As Miss Earhart indicates, the principal problem is stated as it arises, while the details, sources, individual assignments, etc., are worked out later when the topic is taken up in earnest.

All points considered, a definite and rigid rule cannot be laid down for the placing of the assignment. The preceding

[3] *Op. cit.*, p. 82.

discussion will cover many cases, but where conditions are shifting rapidly, necessitating daily adjustment to the progress of the class, the teacher should bear in mind that a careful assignment must be made, and she should not allow the closing bell to call her attention to the fact that she has not made it.

Adapting to individual differences. Reference has been made several times to group and individual assignments. In many cases, of course, there is but the one assignment for the whole class, but wherever possible there should be varied assignments adapted to different groups within the class. Attention has already been called to the device of a minimum-essentials requirement for all, supplemented by extra work for the brighter individuals. Sometimes the supplementary work will be more of the same kind as that covered in the minimum essentials; or again, the more lengthy reports requiring more reading and organization can be given to the brighter pupils, and the shorter, more easily organized ones to the slower group. This avoids open division in the class since the latter group rarely recognizes that their assignments are less difficult than the others. In addition, they thus obtain experience in gathering data, in organizing, and in reporting to the class in terms of their abilities. There are other benefits in self-confidence, fun of participating, and time saved.

Excellent examples of such assignments will be found throughout Mabel E. Simpson's [4] *Supervised Study in American History,* of which the following are illustrations:

Lesson aim: *What were the results of the Crusades?*

1. *Minimum assignment:* The effect of the Crusades on commerce.
   a. Why did the Italian cities such as Venice and Genoa profit as a result of the Crusades? [p. 220]

[4] Mabel E. Simpson, *Supervised Study in American History* (1919), pp. 74, 85. By permission of the Macmillan Company, publishers.

b. Make a list of the articles the Venetians transported:

(1) From the East to the West.
(2) From the West to the East.

c. How were these Eastern products distributed among the peoples of Europe? [p. 221]

2. *Average assignment:* What the people of Europe learned from the people of the East.

d. What were some of the things adopted by the people of Europe as a result of the journeys to the Holy Land? [W. and M., p. 171; G., p. 222.]

e. In what other ways were the Crusades a benefit to the people during the Middle Ages? [G., pp. 223-228; N., pp. 223-231.] [A list of references is inserted here.]

3. *Maximum assignment:* Questions prepared for to-morrow's review. Pupils completing I and II may serve on a committee which will prepare the questions for the class. These pupils should be allowed to work together quietly in one section of the room. The questions should aim to cover the important points in the lesson studied. If a large number reach the maximum, two committees might be formed—one to prepare the questions, the other to judge of their worth.

Another type of assignment, involving a slightly different maximum report, will be found in the following:

Lesson Aim: *Why did European nations wish to explore and colonize the New World?*

1. *Minimum assignment:*

a. Using Montgomery's *Leading Facts of American History* as reference, find the countries of Europe most concerned in exploring the New World.

b. Under the name of each country, make a list of all the explorers you can find who rendered valuable services.

c. Write the date of exploration after the name of each explorer you have found.

d. After each name, list pages to show your source of information.

2. *Average assignment:*

e. Verify the work you have done by using Gordy's *History of the United States* as a reference. Make any addi-

ditions necessary as a result of consulting the second reference. List all pages as directed in 1. *d*.

3. *Maximum assignment:*
   f. Write a paragraph at the board telling whether or not you consider our problem under consideration to-day to have been solved. Give your reasons for your answer.

These two will serve to illustrate Miss Simpson's general procedure, and her book should be consulted by those interested in utilizing this scheme of assignment.

The organization of supplementary assignments presents the opportunity for considerable variation and originality on the part of the teacher. In the formal subjects involving much drill, proficiency can be determined by means of standardized tests, and the leaders excused from further drill other than an occasional test to see that the associations are firmly fixed. Such pupils can then be given other work, such as lists of problems applying the drill facts. Problems can be mimeographed and supplied, or the teacher can have a list of references to other texts. Pupils can even be given work in other subjects, such as supplementary reading, construction, etc. They can work upon voluntary projects.

In geography, the minimum essentials would consist of the knowledge and activities necessary to achieve the understanding desired. The brighter ones can be given reading upon which to report to the class, thus bringing in much worth while material and developing further implications of the understanding. The pupils reporting gain the information, and in addition the skill in reading, organizing, and reporting on data. The slow ones benefit materially from hearing interesting material not contained in the text. History presents the same opportunity.

The objection is often raised that no teacher has time to organize any sufficient system of supplementary assign-

ments. This is, in a measure, true, but such a system is the product of a period of growth and of the joint efforts of several people. A group of teachers working under the direction of a supervisor can very well organize such a system without undue expenditure of time or energy. The effort will take time, of course, but need not necessitate the teachers' giving up afternoons and evenings to extra school work, though it will pinch the teacher who is proud of the fact that she forgets her work when the last bell rings and does not think of it again until 9 A.M. Between the two extremes, there is ample room for much good constructive work that is neither a tax nor an imposition. In addition, there is much excellent material summarized here and there which might be collected, ready to use. A good example will be found in the *Nineteenth Yearbook*, Part I, National Society for the Study of Education.

Systematic versus opportunistic assignments. A good deal of emphasis has been placed by modern writers on pupil purpose and on pupil-planned lessons. Applied to assignments, extremists would do away with assignments as traditionally and commonly used and proceed largely, if not wholly, on pupil determined tasks and by pupil determined methods. "Assignments" would wait upon opportunities presented by the pupils, not upon teacher development of the situation. The other extreme, of course, is the teacher determined and assigned task. As emphasized throughout this volume, probably neither extreme is safe. The pupil's learning process is the important item, his motives are the vital elements, but he is immature and needs direction. The view presented here, therefore, is that assignments as such are necessary and legitimate, but will be based as far as possible on pupil activities and desires. If this is not immediately possible, assignments should be of such nature as to arouse and invite pupil interest and participation.

Two interesting studies are available bearing upon systematic *vs.* opportunistic assignments. Collings [5] presents an unusually interesting account of a four-year experiment with teaching method. We may disregard his use of the term *project* and focus on his actual procedure. Briefly, it was to organize learning activity as far as possible in terms of the learners' desires, activities, purposes, with a minimum of teacher dominance. No *subjects,* as such, were assigned or taught in the experimental school. A curriculum was developed out of pupil suggested activity. After four years, subject-matter tests were given, showing that the experimental school averaged 38 per cent better than the schools which had been taught by traditional subject assignments. This seems convincing, but Monroe [6] makes the following analytic criticism:

> However, when one inquires concerning the equivalence of the experimental school and the two control schools, he finds several factors other than the curriculum and the associated instructional procedures that differ. Among those that Collings lists are: (1) library and equipment, being distinctly superior in the experimental school; (2) number of teachers (a second teacher was employed in the experimental school at the middle of the first year); (3) weekly community meetings in which the pupils participated were "an integral part of the procedure" of the experimental school in contrast with about six community meetings of the "adult type" in the control schools; and (4) a distinctly greater amount of supervision of the experimental school. In addition to the factors that Collings lists, one suspects that the teachers in the experimental school together with Collings who was the supervisor (county superintendent) exhibited much greater zeal and enthusiasm and invested more energy in the work than did the teachers in the control schools.

The experiment, while valuable and highly suggestive, does not, therefore, seem conclusive.

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[5] Ellsworth Collings, *An Experiment with the Project Curriculum* (Macmillan Co., 1923).

[6] W. S. Monroe, *Directing Learning in the High School* (Doubleday, Page & Co., 1927), pp. 458-459.

On the other hand, Gates [7] suggests a controlled experiment contrasting results secured by following a regular course of study, by definite interesting assignments, and by organizing learning exercises in terms of opportunities presented and suggested by the learners. In this case, the group taught by systematic assignments not only averaged distinctly higher than did the opportunistic group, but the variation in scores was much less. While a much better example of scientific work, this experiment, like Collings', is not conclusive. Measured results were almost wholly subject-matter response, though Collings reports on many others also.

In the light of the little evidence available, and in terms of logical analysis of the actual situation confronting the teacher, it seems best to insist on a definite, systematic organization of the curriculum assigned to the learner. To be sure, assignments will be made as often as possible growing directly out of pupil activity and motive, but failing that, systematic assignments must be made.

The pre-test in relation to assignment. All planning of teaching and all assignment should rest upon the pre-test. As the word indicates, the status of the class is investigated as a basis for teaching procedures. This preliminary step may take the form of a discussion, an oral or written test, or of any other diagnostic procedure. The purpose is to supply data to the teacher as to the needs of the class, the individual differences within the group, probable difficulties, etc. Group and individual assignments may be made, and the general conduct of the unit planned, so that the actual needs of the situation will be met. Obviously, the teaching of a given lesson or unit will vary from group to group in any school system, and from year to year in the same

[7] A. I. Gates, "A Modern Systematic *versus* an Opportunistic Method of Teaching," *Teachers College Record,* Vol. 27, April, 1926, pp. 679-700.

school. Ordinarily the variation in conditions will be small, though sometimes peculiar combinations will necessitate marked changes in the ordinary teaching procedure for a given unit.

Discussion Questions for Summarizing and Testing on Problem 1

1. A teacher tried the following experiment. She assigned a lesson and said that the class could take the next fifteen minutes of the period to study, instead of waiting until they went home. A few pupils were utterly unable to begin, others took the whole fifteen minutes to get started, some looked around helplessly and imitated others. But all these pupils had been coming to class every day with their home work completed with reasonable correctness.

a. What legitimate inferences may be drawn regarding the nature of the pupils' home study?
b. What kinds of training were probably taking place; what kinds not being accomplished?
c. What faults might have appeared in the teacher's assignments?
d. What advice might you give her?
e. What difficulties might appear which were not the fault of the teacher?

2. Cite a specific case of an especially poor assignment you recall having received in high school or college. Do the same for an especially good assignment.

3. Are there any lessons which can legitimately be assigned by pages or lists of problems? Are there any which need only designation and direction to "get it"?

4. Is it ever safe to say "Always use ten minutes of each period for assigning"?

5. Is it ever safe to say "No lesson should be assigned unless the students feel a real need for it"?

6. In many schools assignments are written on the board and copied by the students. Critically evaluate this procedure.

7. When a pupil says, "I did not know where the lesson was," where may the fault be? Make several diagnoses.

8. Should a teacher ever permit digressions from the assignment during the study or discussion period? Ever permit abandonment?

9. Can a teacher ever assign properly without a pre-test?

10. What would be your attitude if your classes presented an organized protest asserting that assignments were too long?

Observation Exercise for Problem 1

Teacher Activity

1. *Does the teacher show skill in placing the different types of assignments where they belong in the period?*

a. Does she place at the beginning of the period those assignments that do not depend on the day's lesson?
b. Does she avoid getting caught at the end of the period with an unfinished or hurried assignment?
c. Does she skillfully seize opportunities for assigning that arise during the course of the recitation? Can she do this and slip back into the recitation with a minimum of disruption?

2. *In developing the main topic or problem, does she:*

a. Recall the old knowledge clearly and slowly enough for all to get it? Is the statement of the aim or the development of it such as to arouse interest and effort?
b. Set clearly before the pupils any directions to be followed or models to be imitated?
c. Make brief, exact statements? Avoid vague, general statements, such as "find out all you can about," or "discuss fully"?

3. *Does she give sufficient and appropriate study hints or aids?*

a. Such as to aid the pupil in studying without making him dependent?
b. Which make for reflective thinking and mastery of ideas, rather than mere memorization of words?
c. Designate sufficient, well chosen, available sources?
d. Such as to clear up or prepare for difficulties that will be met?
e. Are outlines used, either prepared in advance or developed in class? Are they of such nature as to train pupil to weigh evidence and organize material? Does she avoid the useless copying by the pupil of outlines and references which by their nature are fixed and should be mimeographed?

4. *Does she check finally to see that all are clear?*

a. Ask child or group to repeat aim or tell briefly what is to be done?
b. Encourage the asking of questions by the class in order to clear up? Discriminate between answering such questions for the slow pupil who didn't get it and for the indifferent, lazy pupil who was inattentive?

5. *Does she make use of the principle of individual differences?*

a. Does she avoid assigning too much for most of the pupils? Too little?

b. Wherever possible is there plainly a minimum-essentials requirement which all can get, so that the slowest may have the satisfaction of completing it?

c. Is supplementary work for the brighter ones skillfully introduced, so that they are kept busy?

d. When individual assignments are made, are they adapted so that the bright, capable pupil gets the work fitted to him? The slower ones the work they can accomplish?

e. Does she avoid a realization by the pupils of this seeming discrimination in assignments?

Pupil Activity

1. Do the pupils raise new problems for solution as outgrowths of the one under discussion? Do they ask such questions as lead to such new problems?

2. Do they attempt to get better understanding and clearer wording of the problem by asking questions about it? By rewording themselves?

3. Do they develop the finished statement of the problem, subheads if any, and the method of attack, through a discussion freely participated in by all members of the group?

4. Do they assist in breaking the main problem into smaller ones, and in assigning these to groups within the class? Are they active and aggressive in outlining the problem? In suggesting methods of procedure?

5. Do they volunteer to be responsible for one of the subaims? For certain sources of information? For such extra work as arises in the course of the discussion?

6. Do they volunteer information already in their possession?

7. Do they ask questions that indicate a realization of the problems that will confront them when they attack the sources and begin to gather evidence? Do they recall any study rules or hints which may have been given to them?

8. Do they use notes or written outlines in lengthy assignments?

9. If they ask each other questions about the assignment, do the questions indicate inattention by the pupil or insufficient and hurried assignment by the teacher?

10. Can they restate or outline briefly the problem? The general line of attack in summary form?

11. The observer should note also the effect of varied assignments on the class; whether they take it as a matter of course, regard the longer assignments as a burden, a challenge, etc.? Do the slower ones hurry in an effort to do more than their ability warrants, become discouraged, etc.?

Parallel Readings for Problem 1

1. Earhart, Lida B., *Types of Teaching* (Houghton Mifflin Co., 1915). Very good discussion in Ch. viii.
2. Gray, W. S., "Methods of Improving the Technique of Teaching," *Elementary School Journal,* Vol. 20, December, 1919, pp. 263-275. See page 268 for good description of the evolution of a set of supplementary assignments.
3. Grant, J. R., *Acquiring Skill in Teaching* (Silver, Burdett & Co., 1927), pp. 143-147. Good list of test statements for discussion.
4. Hall-Quest, A. L., *Supervised Study* (Macmillan Co., 1916). Use the index to find many good discussions.
5. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927). Use the index.
6. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926).
7. National Society for the Study of Education "New Materials of Instruction," *Nineteenth Yearbook* (Public School Publishing Co., 1920). Part I. Interesting and suggestive collection of supplementary lessons and material.
8. Simpson, Mabel E., *Supervised Study in American History* (Macmillan Co., 1920). The entire book is made up of lesson outlines, each of which has valuable examples and discussions regarding assignment.
9. Waples, Douglas, *Procedures in High School Teaching* (Macmillan Co., 1925), Ch. x.
10. Wilson, H. B., Kyte, G. C., and Lull, H. G., *Modern Methods of Teaching* (Silver, Burdett & Co., 1924), Ch. xiv.

PROBLEM 2

HOW MAY A GOOD QUESTIONING TECHNIQUE BE DEVELOPED?

Exploratory and Pre-Test Questions

1. A sixth-grade class was gently chided by the teacher for failing to answer a supposedly simple question. A little girl replied, "Us kids don't know what those two big words mean." What very simple point about questioning is illustrated? Can you duplicate this illustration from your own high-school or college experience?

2. A teacher asked a class in home geography that was developing simple geographical concepts of distance, direction, etc., leading to latitude and longitude, "How would you get from the depot to the Ellberton Hotel?" A boy replied, "I'd walk," whereupon the teacher became very angry and scolded him for impertinence. What simple point is illustrated? If it is not immediately apparent, try to discover the faults of the two questions below that illustrate the same point.

a. What do soldiers have when they go into battle?
b. What does glass do when it is heated?

3. What is the matter with the following questions:

a. Discuss Coolidge's Nicaraguan policy.
b. What can you say of the French invasion of the Rhineland?
c. Tell all you know about affairs preceding the firing upon Fort Sumter.

4. What is the matter with this question:

a. Who dragged whom around the walls of what? [This is an actual question found in an examination.]

5. What fault in questioning is indicated in the following:

a. Show why alcohol is not a food and why it is bad for us.
b. Did the German submarine have a right to enter our port and what should we do about it?

6. A writer, listening to some teachers' questions, has said that "Education like dentistry and mining was an extractive industry." What did he mean?

7. Should the difficult questions be given to the duller pupils to stimulate them, or to the brighter pupils who will answer them easily?

8. It was found in one high-school test of twenty-two pupils that one pupil was called upon twice in two weeks, while another pupil was called upon eleven times in the same period. In another class of only thirteen pupils, one was called on four times and another eighteen times. What simple point of technique had the teacher overlooked?

9. Teachers have been known to ask one hundred fifty questions in forty minutes. Is this all right, all wrong, or would circumstances alter cases?

10. Should teachers write out in advance the questions they will ask?

11. Should teachers enter a grade for each pupil daily and at the time when major questions are answered during recitation?

12. What principles already discussed in this course are of assistance to you in developing a good questioning technique?

Early discussions regarding the technique of questioning were confined, with a few notable exceptions, to classification and description of types of questions. They were about as valuable, according to DeGarmo, as was the formula for learning French in eleven days: divide the language into eleven parts and learn one part each day! There are now, however, many excellent studies of questioning, statistical as well as theoretical, and some pronouncements can be made safely. The present discussion deliberately omits classified listing of question types. They are of little or no value, but if desired, can be found in many textbooks.

Thoroughly good questioning is a most difficult problem, and it remains a problem, at least in part, for many good teachers. It requires the ability, native or acquired, to think quickly and easily while facing a class, to shift and

change as thought progresses, and to phrase questions clearly and unambiguously. These requirements puncture, in some measure, the pleasant fiction that the slow but efficient thinker can, in the end, do anything that the quick person can. A slow thinker, no matter how efficient and conscientious, will always have difficulty with a class of normal pupils. Furthermore, these requirements point to the necessity of lesson planning, whether elaborately or in brief. Very few people are gifted enough to be able to follow the thought of a group, to shift and turn quickly enough, to guide the lesson to the desired end, without some previous preparation. Careful planning, involving a study of the subject matter, cannot fail to suggest to the teacher many of the possible questions and digressions with which she will be confronted. Planning for these in advance saves much time and energy during the class period, in addition to preventing some erroneous thinking.

Questions can be grouped roughly in two classes: thought questions designed to stimulate the pupil's reflective processes, and drill questions designed to test the pupil's memory of isolated facts or arbitrary associations. The following discussion applied generally to both types, though they are markedly different in respect to number and speed in a given period. Drill questions may be numerous and rapidly given, the answers coming almost immediately. Thought questions, on the other hand, require time, and the teacher must school herself to wait patiently until the thinking is done.

Characteristics of good questions. For the sake of brevity and clarity some of the following points will be made in the positive form and others in the negative.

Use words well within the vocabulary of the pupil. The first element in good questioning, freedom from unknown and ambiguous words or obscure expressions, involves the principle of apperception discussed previously. Foreign or

obsolete words will probably not be found in grade-school questions, but the best of teachers often use common words that are still beyond the comprehension of a majority of the class. Many children are badly confused by being asked to "Discuss the *influence* of . . . ," or "*Compare* the industries of . . ." since the words *influence* and *compare* are not yet understood. The illustration of a class which failed a question because of the word *semester* used in place of the word *term,* is a case in point.

Closely allied to this element of freedom from unknown words is the advisability of avoiding words that may have more than one meaning, or that do not clearly direct thought to what is wanted.

Avoid involved phrases and digressions. If questions are to direct thought, they must be to the point, avoiding long and involved phrases or supposedly facetious digressions. Several excellent examples of questions showing clearly difficulties in this respect, too long to quote here, may be found in DeGarmo, *Interest and Education,* pages 184-185.

Certain questions, clear enough as regards language, are confusing because they call for more or less final answers when such are not available, or can only be guessed at by the pupils. They are directed at the causes and solutions of certain historical events, wars, revolutions, economic upheavals, political movements, etc., or call for moral judgments to be passed upon such events. If superficial answers are accepted, the pupils are being trained in poor thinking, because the real answers to such questions have puzzled the best thinkers of the day. Such questions are permissible when it is clearly understood that they are to stimulate discussion, a search for data and their organization, and to train in suspension of judgment. There should be permitted difference of opinion regarding the proper answer. It is to be regretted that certain textbooks definitely set forth ex-

planations of problems and solutions of events that have never been explained to the satisfaction of wise and expert thinkers.

Avoid leading questions. While it seems so simple as to obviate discussion, it is still necessary, judging by observation, to caution prospective teachers against the type of question that, to use a slang phrase, "demand an affirmative answer." "Pericles was banished from Athens, was he not?" "Lincoln was right in freeing the slaves, was he not?" Leading questions should ordinarily be avoided.

Avoid alternating or double questions. Likewise, the question presenting a choice between two alternatives is practically worthless, unless the two alternatives are controversial and admit of taking sides for argument or gathering data. "Is there great rainfall or not in Western Oregon?" "Was Pizarro a Spaniard or a Portuguese?"

Another type of question that lacks clarity is one involving two ideas. The following examples were previously cited in the Exploratory Questions: "Why is alcohol not a food and why is it bad for us?" "Did the German submarine have a right to enter our ports and what ought we to do about it?"

Avoid fragmentary questions. Time should not be wasted in attempting to extract an answer which the rest of the class knows, from a pupil who does not know it. Many teachers think it an index of pedagogical expertness to pursue a student with a volley of questions in an effort to get a desired response. "It makes him think," "He must get it himself," they say. Very obviously the procedure embarrasses and muddles the poor student so that he cannot think. If the rest of the class know and the question is simple, another pupil should supply the information. If it involves training in analysis, needed by most of the class, then a series of questions, slowly and sympathetically given, is valuable. Where there are peculiar individual differences,

these should be held over for individual help during supervised study.

Half-trained teachers often decry the use of "yes" or "no" questions. Such questions are to be criticized only when the thinking stops there; followed by questions relating to the reasons for the stand taken, they are quite legitimate.

Avoid "discuss" questions. Contrasted with the leading question is the one supplying too little guidance and stimulation. Much use is made in high school and college of this general form, "Discuss the reign of Nero," "Discuss the results of the Western Movement," "Discuss the Missouri Compromise."

While the point is controversial, the present writer stands for the elimination of such questions. As they stand, they are open to a number of serious criticisms, and are responsible for much unfairness in grading student answers.

If a student writes in answer to "Discuss Coolidge's Nicaraguan Policy," the sentence, "It was a poor one, quite unjustified, and barren of results," he has fulfilled the conditions of the question. "But," says the instructor, "I meant that he was to outline the circumstance leading to the evolution of the policy, the events following its announcement, results to date, and probable future. I wanted a detailed, organized discussion." But the question neither implies nor demands anything of the sort. It suggests to the student no beginning, organization, or end, nor can he fairly be held for the discussion which is in the instructor's mind. Any discussion on the point is a satisfactory answer, lengthy or brief, organized or unorganized.

This leads us to the second point and to the crux of the situation. Its proponents say that such a question teaches a student to organize. Not at all, it may permit equally well of rambling incoherent presentation. If the instructor refuses to grade a poor organization, he is grading by a criterion not implied in the question. Here lies the crux.

Most instructors have in mind an organization and sequence they wish reproduced when they ask "discuss" questions. If the students have been instructed and drilled in the proper type of answer for the particular instructor, the question is perhaps legitimate. However, the "proper" answer varies with instructors. The question is a shot in the dark and seems a lazy teacher's device.

The student can be taught to organize by better devices than a few vague "discuss" questions. In fact, he should be taught to organize long before test and summary questions are due. [See Reading, and Expression, Problems 4 and 5, Unit IV.] If organized reproduction of material is desired and the student is trained, he may be asked to "Present in organized form the origin, development, and present status of Coolidge's Nicaraguan policy." There is then a definite answer implied, and a fair criterion of grading established.

Again the instructor may desire a critical comparison. He may reject both a rambling discussion and the type of organized discussion another instructor would accept. The student cannot be a mind reader, and if the instructor means by "discuss," a critical comparison, he should ask for it.

Monroe and Carter[1] present the following types of thought questions. The two illustrative questions in Group 1 might be improved upon, and Group 12 is open to question, but otherwise the list is of value in assisting teachers to frame questions properly.

1. *Selective recall, basis given.*
   Name the Presidents of the United States who had been in military life before their election.

[1] Monroe and Carter, "The Use of Different Types of Thought Questions in Secondary Schools and Their Relative Difficulty for Students," Bureau of Educational Research, *Bulletin* No. 14, University of Illinois Bulletin, Vol. 20, No. 34 (1923), pp. 6-7.

What do New Zealand and Australia sell in Europe that may interfere with our markets?

2. *Evaluating recall, basis given.*
   Which do you consider the three most important American inventions in the nineteenth century, from the standpoint of expansion and growth of transportation?
   Name the three statesmen who have had the greatest influence on economic legislation in the United States. [A period of years may be introduced in this question.]
3. *Comparison of two things on a single designated basis.* [More than two things may be involved.]
   Compare Eliot and Thackeray with reference to ability in character delineation.
   Compare the armies of the North and the South in the Civil War, as to leadership.
4. *Comparison of two things in general.*
   Compare the early settlers of the Massachusetts Colony with those of the Virginia Colony.
   Contrast the life of Silas Marner in Raveloe with his life in Lantern Yard.
5. *Decision for or against.*
   Whom do you admire more, Washington or Lincoln?
   In which, in your opinion, can you do better, oral or written examinations?
6. *Causes or effects, and reasons for.*
   Why has the Senate become a much more powerful body than the House of Representatives?
   What caused Silas Marner to change from what he was in Lantern Yard to what he was in Raveloe?
7. *Explanation* of the use or exact meaning of some phrase or statement in a passage.
8. *Analysis.* [The word itself is seldom involved in the question.]
9. *Statement of relationships.*
   Why is a knowledge of botany helpful in studying agriculture?
   Tell the relation of exercise to good health.
10. *Illustrations or examples* (your own) of principles in science, construction in language, etc.
11. *Classification.* [Usually the converse of No. 10.] What is the principle involved here? What is the construction? To what class or genus does this individual belong?

12. *Discussion.*
    Discuss the Monroe Doctrine.
    Discuss early American literature.
13. *Criticism as to adequacy, correctness, or relevancy.*
    This type of question may refer to a printed statement, or a classmate's answer to a question on the lesson.

Avoid catch questions. Most of us have been caught by such questions as the following:

An athlete is to run around a square field. It takes him 40 seconds to run the first side which is 140 yards. It takes him 50 seconds to run the second side. How long is the second side?

A train leaves Chicago for New York traveling 50 miles an hour. At the same time a train leaves New York for Chicago going 65 miles an hour. Which will be farthest from New York when they meet?

Following normal and sensible mathematical attitudes and precedents, many individuals will try to work such problems. The catch is then explained. In the first the second side is also 140 yards; the problem says the field is square. In the second, both trains will be the *same* distance from New York when they *meet*.

Intrigued by the trick we tend to say, "Such problems make one think." In fact they confuse thinking and make one "think" in ways which are not valuable in real problems. The uncritical teacher confuses "hunting for the catch," with true "analysis of the problem." Real thinking has to do with ferreting out true and logical connections, and not discovering odd and bizarre tricks which would rarely appear in a real problem. The mental attitude engendered by catch questions is inimical to the desired attitude in analytic thinking. Looking for catches prevents one's seeing the logical connections. Discussion of questions which aid real analysis has already been presented in connection with problem solving and supervised study.

Adapt to individual differences. There has been considerable debate in regard to the distribution of the more difficult thought questions. Many teachers held that they should be given to the weak student in order to spur him to effort and to give him practice in analyzing difficult situations. Success is said to bring satisfaction and confidence. On the other hand, the poor student is seldom able to solve such questions, and while he may get some practice in thinking, he is more likely to become embarrassed and confused. The time of the class is wasted as well. The better plan is probably to distribute these questions among the brighter pupils. Their analysis of the situation is of value to the slower pupils, who can follow their fellow students better in many cases than they can the teacher. The weaker pupils should then be given the easier questions which they can solve with some degree of facility. Such questions will probably afford them as much opportunity for thinking as they are capable of profiting by. The flashy superficial pupil should be given difficult questions and held rigidly for results, in order that he may appreciate and experience the value of good work and correct analysis.

Mechanical features. Questions should be addressed to the whole group and the pupil designated a moment or two later, thus inducing every one to attend and at least to start thinking about the answer. Alphabetical or other fixed orders of calling on pupils should be avoided, though some device to insure fair distribution must be provided. Glancing over the roll just previous to class and noting those who have been missed lately will help. Writing those names on a card is even better. Shuffling class cards is another good device. One of the chief reasons for failure to distribute questions is the fact that teachers very naturally tend to favor those children who ask questions themselves, who volunteer, and who contribute to the

recitation period, and this can be adjusted by some such device as suggested above.

It might be noted in passing that many teachers dislike the pupil who asks questions, and strive to discourage such activity. Careful distinction should be made, of course, between the interested, alert pupil who asks intelligent and legitimate questions, and the bluffer who wastes time with many foolish and irrelevant ones. Teachers who consistently discourage the first type of pupil indicate either great laziness or complete ignorance regarding their functions as teachers. If they will not or cannot encourage, guide, and enter into the learning process of the pupils, they should be summarily dismissed.

Questions should not be habitually repeated, because this makes for lack of attention. However, care should be taken not to offend or embarrass the conscientious pupil who occasionally asks for repetition of a question which he could not hear or did not understand. Curt refusal to repeat is legitimate in the case of the consistently inattentive pupil.

Many teachers tend very naturally to repeat the answers, either for emphasis or to better the wording. This is a most difficult fault to eradicate, but it should be attended to as it encourages fragmentary, incomplete, and poorly worded answers.

It has long been customary for teachers to demand that pupils' answers be in the form of complete statements. This is undoubtedly a good thing in most instances, especially in content subjects involving class discussions, but it is to be noted that there are other class exercises in which such a procedure slows down the lesson. In addition, like situations in real life would not demand the complete answer.

Faults in answering questions. Teachers have been asked to analyze pupils' habits in answering questions and

to suggest the chief faults. The following seem to be the most prevalent:

1. Students begin to answer before thinking out the complete implication of the question.
   a. A fragmentary answer results.
   b. Minor points may be magnified and major points neglected.
2. Students seem to expect continued stimulation from the teacher.
   a. Fragmentary, choppy, answers result in which a point at a time is given.
3. Students feel that they have answered a question if they give any one or two of several points which could be given.
   a. Inadequate, unorganized answers are given.
4. Students feel no responsibility for organization, sequence, and coherence.
   a. Rambling discursive answers result.
   b. Relative values are neglected.
5. Students seems to be seeking to discover what the teacher wants, rather than to evolve answers based on the data and implications.
   a. Answers are dictated by suggestibility rather than analysis and thought.

Obviously these points overlap, but they are stated separately for the sake of emphasis. It is equally obvious that the teacher's mode of questioning, and the type of answer she accepts, develop proper or improper habits of answering. Such an analysis of pupils' answers supplies guidance to the teacher in framing her questions.

Discussion Questions for Summarizing and Testing Problem 2

1. Take the list of faults in answering, presented above, and show briefly how the teacher may contribute to each of them. How she may assist in curing them.

2. Give examples, if you can recall them (or watch for them now), of particularly skillful guidance of class discussion by ques-

tions either prepared in advance or in terms of the demands of the class hour. [A number of students should answer this illustrating various points.]

3. Do the same thing for cases of particularly poor practice.

4. Do most teachers ask too many or too few questions in a class hour? What conditions determine the proper number?

5. How will you probably learn to construct good questions?

6. How would you handle a student who is bright but a good bluffer, who rarely studies carefully?

7. How can you stimulate pupils to ask questions?

Observation Exercise for Problem 2

Teacher Activity

1. Does the teacher manifest ability to word questions clearly and concisely? Avoid series of short, fragmentary questions?

2. Does she avoid vague "discuss," "tell-all-you-know" questions?

3. Does she adjust easily to legitimate interruptions, disposing of them or following them up with clear-cut direct questions? Does she encourage independent questioning by the pupils?

4. Does she quickly see that her language or construction is confusing to the class? Can she reword statements quickly?

5. Does she use thought and drill questions in right proportion? Directed at proper material? Does she vary the pace?

6. Does she distribute questions over the class fairly well? In terms of individual differences?

7. Does she avoid answering the questions herself? Avoid repeating them except in legitimate cases? Insist on clear, intelligent answers? Avoid repeating the pupil's answer?

Pupil Activity

1. Do all pupils seem alert to each question? Do they avoid asking for unnecessary repetitions?

2. Do they volunteer frequently, or wait to be called upon?

3. Do they frankly state the fact that they do not know occasionally? Avoid "stalling" or "bluffing"?

4. Do they make their answers and stand by them, supporting them with such data as they have? Avoid trying to answer in terms of what they think the teacher wants?

5. Do they make complete, coherent answers when such answers are necessary? Do they manifest the ability to stand and talk for a minute or so in explaining a point? Do they answer readily with a word or a phrase when this type of answer is legitimate?

6. Do they avoid repeating themselves? Avoid repeating what a pupil has already said?

7. Do they answer with reasonable speed to drill questions? Take such time as is necessary to construct answers to thought questions?

Evaluation Exercise for Problem 2

1. Secure a lesson plan, or lesson report, containing a fairly detailed account of the question-and-answer procedure of the class period.

Such printed accounts may be found in:

a. Anderson, C. J., Barr, A. S., and Bush, M., *Visiting the Teacher at Work* (D. Appleton & Co., 1925). Scattered through book.
b. Several of the references listed at the end of Problem 4A, Unit III. Use the index or table of contents.
c. References 2, 5, and 8 at the end of this discussion.

Read the account noting the characteristics of the general questioning procedure, and also good and poor characteristics of selected questions.

Apply the list of points given above under "Teacher Activity" in the "Observation Exercise." Be ready to present an organized and supported critique of the questioning procedure which you examined.

The list may be applied if desired to the questioning technique of one of your present instructors in such classes as involve free discussion and opportunity to note efficacy of prepared and spontaneous questioning.

Parallel Readings for Problem 2

1. Charters, W. W., *Methods of Teaching* (Row, Peterson Co., 1912), Ch. xviii.
2. DeGarmo, Charles, *Interest and Education* (Macmillan Co., 1908). Excellent concrete discussion in Ch. xiv.
3. Foster, H. H., *Principles of Teaching in Secondary Education* (Charles Scribner's Sons, 1921), Ch. v.
4 Grant, J. R., *Acquiring Skill in Teaching* (Silver, Burdett & Co., 1927), pp. 156-160. Good set of discussion statements.

5. Hall, J. W., *The Question as a Factor in Teaching* (Houghton Mifflin Co., 1916).
6. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927).
7. Parker, S. C., *Methods of Teaching in High Schools* (Ginn & Co., 1915, revised, 1920), Ch. xx.
8. Stevens, Romiett, "The Question as a Measure of Efficiency in Instruction," Teachers College (1912). Excellent critical and descriptive study.
9. Waples, Douglas, *Procedures in High School Teaching* (Macmillan Co., 1925), Ch. vii.

PROBLEM 3

HOW MAY THE OUTCOMES OF LEARNING BE EXAMINED AND TESTED?

Exploratory and Pre-Test Questions

1. What are the purposes of examining students? [List several.]

2. Recall the student who passed an examination in agriculture after reading the textbook the night before. [Question 1, pre-test list for Problem 3, Unit I.]

a. What did the examination really test?
b. What was supposedly tested, in general, specifically?
c. How should testing have been carried on in this case?

3. The ordinary traditional written examination is a sort of "shot gun" affair, aiming at everything in the hope of hitting something. Actually, we may test directly and specifically for a number of different things. In the main what different things (learnings) may we test for?

4. From your student experience and reaction, make as long a list as you can of the definite weaknesses, as you see them, of the traditional written examination. Can you suggest improvements?

5. On the basis of your experience, and aided by the implications of the foregoing questions, try to construct a few principles of guidance for the making and use of examinations.

6. Have you ever met examinations which were markedly different from the traditional? If so, describe and evaluate.

One of the oft-quoted studies in education is that in which a number of teachers were asked to grade independently the same examination paper. A first year high-school English paper was graded by 142 teachers in as many high schools, a geometry paper by 118 mathematics teachers, and an American history paper by 70 teachers.

The differences in grades assigned by these teachers to one and the same paper were almost unbelievable. The marks for any one paper ran practically the entire range of the percentage scale. The English paper received marks varying from 50 to 98, the history paper from 43 to 90, and the geometry paper dealing with supposedly mathematically precise material actually received the most diverse grades, the range being from 28 to 92!

A similar experiment revealed a fact even more odd. One of the teachers constructed a model answer paper in history to aid him in grading a series of papers which were being evaluated by several teachers. This paper was accidentally mixed in with the others and received marks from the individual teachers varying from 40 to 90! Such data as these are made the bases for complaints about the unfairness of examinations, and for general suspicion of grades and marks as measures of actual achievement. Two problems are clearly indicated. First, how to measure the outcomes of learning, and second, how indicate or record the outcome in terms of a known and reliable standard. For the sake of clarity the two will be discussed separately, the first being the subject of the present discussion. Presentation of the second will be found immediately following.

Ths facts reported above concerning the unreliability [1] of examinations and marks are well-known. Much less well-known is the fact that in many similar experiments a high percentage of agreement among the judges is actually

[1] The statistical data upon which these statements rest is purposely omitted from this volume as it is of no particular value to average students. Furthermore, it is readily available in easily accessible sources. *Cf.,* Daniel Starch and E. C. Elliot, "Reliability of Grading High School Work in Mathematics," *School Review,* Vol. 21 (1913), pp. 254-259; Ben D. Wood, "Measurement of College Work," *Educational Administration and Supervision,* Vol. 7 (September, 1921), pp. 301-334. Even more accessible are the various standard texts on measurement, nearly all of which describe and interpret these and similar studies.

obtained. Furthermore, it has been experimentally shown that for practical purposes an entirely satisfactory agreement can be secured if a standard of judgment is introduced and explained to the teachers, and practice in application given prior to grading. It is quite possible to measure with reasonable accuracy the outcomes of learning, provided teachers know what they are to measure and how to measure it. Confusion has been due, obviously, to failure to define clearly the learning product to be measured, and to failure to set up a standard by which degrees of success are to be measured. Very clearly, the teachers in the experiments cited above were grading a number of learning products under the blanket terms "ability in English," "ability in geometry."

Determine what is to be measured. In general, the purpose of an examination or test is the determining of the degree to which learning has been carried, or if one is fully in accord with Morrison, to determine the presence or absence of learning. In order to test learning properly, the teacher must first clearly understand the nature of the several learning products. For the sake of clarity and emphasis we may repeat from Unit I:

Process	*Product*
Sensori-motor	Skills, arts, motor habits
Perceptual	Specific ideas and meanings
Memorizing	Arbitrary associations, facts
Reflective thought	General ideas, principles, certain mental skills
Emotional	Attitudes, tastes, ideals, habits of enjoyment

Specifically, we may test a learner to see if he possesses a given motor skill and to determine his degree of skill. We may test him for clarity of given ideas, for retention of facts, and for ability to solve problems of a given type and level of difficulty. Testing for the latter—problem-solving

ability—is extremely complex. It involves testing both understanding and application of general ideas, principles, etc., and also skill in various techniques such as gathering, analyzing, organizing, and weighing data. Each of these items may be tested separately, or all may be tested as they function together. In any event, what is being tested must be clearly defined. It is doubtful if we can test or examine, in the traditional sense, the fifth type of learning—the emotional response.

Design appropriate tests for the various learning products. The second requirement is that tests be designed which will properly examine the given learning product under discussion. A good test for measuring retention of facts (the typical school test) is no test at all of problem solving, appreciation, or motor skill. A good description of how to perform certain motor skills is no test at all of ability to perform them. A teacher may give a test in *literature* and assign grades in *literature,* but if she follows common procedure, what she really does is test ability to retain and reproduce certain facts about certain literary productions and their authors. It may even be that the facts retained and reproduced are relatively unimportant. This is not fairly testing *literature.* The learning outcomes lumped off under the blanket term *literature* should be specifically defined as certain general ideas, understandings, appreciations, skills in producing poetry or prose, etc. Tests specifically designed to discover the presence or absence of the given outcomes should be constructed.

In testing and measuring, both school and teacher have traditionally confused memory, working of exercises, and ability to follow directions with true learning. Even when memory has been seen as but one of several legitimate learning products, it has been tested to the exclusion of the others. Further, when attempts are made ostensibly to test other learning results, the error has resulted of trying

to examine them by testing for memory of facts *about* them. As indicated above, problem-solving ability has been "tested" by asking for an outline of the thinking process, for a repetition of the names of the procedures involved, which obviously does not test the designated ability at all. Furthermore, it is obvious that applying the memory test to learnings which really involve doing or application, may in some cases enable inferior students to secure higher ratings than those who have actually acquired the real learning product desired.

It is probably impossible to get final reliable tests for some types of learning, even under ideal conditions. Statisticians can assist in those cases where measurement is mathematically precise by computing coefficients of reliability, probable error, etc. This cannot be done for some types of learning, and ordinarily cannot be done by the teacher at all. In fact, it is doubtful if the teacher need enter into detailed statistical computations, if she applies as carefully as she can certain general principles regarding measurement. It will be satisfactory for practical purposes if teachers can set up situations which will, in the estimation of careful critical thinkers, derive symptomatic evidence of acquisition on the part of the learner.

Testing motor skills. This particular group of learning products is disposed of with relative ease. Performance is directly observable and efficiency judged with reasonable ease. The learner either can or cannot control the movements involved in the given skill. If he can do it at all, he will manifest any of several degrees of skill. We merely watch his attempts, comparing them with objective standards. In some cases, the standards are quite definite and readily available. These are represented by handwriting scales, stenographic and typewriting norms of speed and accuracy, objective descriptions of performance, pictorial standards of good form, etc. Illustrations of these scales

are easily available, so space will not be given to them here. The general principle of guidance is clear from the foregoing brief discussion.

Testing perceptual learning. This type of learning goes on in conjunction with nearly all other types of learning and is rarely tested specifically. The other learning processes test perceptual learning constantly, since clear and accurate perceptions are necessary in the conduct of these other learnings. If it is necessary and desirable to test directly for clarity of certain perceptions or specific ideas, it can be done easily in traditional ways, by asking for accurate detailed description, by recognition tests, by analysis of comparisons, etc. Good illustrations of items which test chiefly perceptual learnings are to be found in Part II of the *Ruch-Popenoe General Science Test.* This part of the test is designed to examine the students familiarity with (recognition of) pieces of apparatus, organisms, mechanisms, and also recognition of and ability to apply principles. Items designed to test the latter are, of course, problem-solving exercises and do not concern us here, but those designed to test the former are admirable examples of tests for perceptual learning.

Testing memorization. This type of learning is tested more easily than any other. Traditionally it has been tested almost to the exclusion of other learning products. The method is to ask for the repetition of facts, dates, names, passages, etc. Summarizing or outlining material without recourse to the sources is also a memory test. The traditional written examination, in which the student answers from six to twelve questions by writing out what he knows on the topic, is probably the commonest instrument. It is usually referred to as the *essay* type of examination. Due to the rise of standardized tests and the "new" objective tests, the essay test should probably not be used extensively in the field of memorization. Properly organized,

it can be utilized more effectively in testing understanding and problem solving, under which topic it will be discussed a few pages further on.

The use of standard tests. The chief improvement in testing memory is represented in the standard test. Though some of these are designed to examine phases of problem solving, comprehension, quality, skill, etc., many of them test memory or certain special abilities which depend largely upon memory or upon immediate association.

Because of the number and diversity of tests,[2] and the very evident variability in value of those available, it is futile to attempt illustration here. Good examples of memory tests are to be found in most of the geography and history tests, range-of-information tests in civics, science, etc., in vocabulary tests, and in tests in formal grammar, punctuation, etc.

Apart from memory proper, the other items closely related to memory and best examined by standardized tests, are those skills associated with special abilities, such as addition, subtraction, reading, etc. Spelling is sometimes classified here, and sometimes as pure memory. Even these items are complex, as will be shown in greater detail in later pages. Addition, for example, involves at least seven, and division ten sets of specific automatic associations and

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[2] It is assumed that students, by the time they reach this course, will have come in contact with standardized tests and will understand in an elementary way their general uses, and perhaps some principles of construction. When the series of introductory volumes of which this volume is a part, is completed, definite discussion of tests will be provided early in the series. In the event that a class has had no contacts, the instructor may at this point wisely devote from one to three class hours to describing a few of the best known tests, showing samples, and administering one or two to the class. In any event, the instructor should have on hand an adequate museum of tests for illustrative purposes, properly classified as to learning product measured. Students should examine these, analyzing them, and asking such questions as may be necessary.

reactions. Reading is even more difficult to test accurately, as it not only involves both rate and comprehension, but the latter must be tested by a supplementary performance, such as answering questions orally or in writing, marking pictures, etc. Furthermore, there are several significantly different reading purposes, each of which should beget different learning results, necessitating a differentiation of testing procedure. The task here is to get an inventory of responses.

The best advice to give teachers in regard to standard tests is to emphasize the fact that they are not universal nor all inclusive testing instruments. They are reasonably adequate and accurate measures for some kinds of learning, and not, in any sense, of other types of learning. Additional testing techniques will always be necessary. Teachers have neither the time nor the training to apply technical statistical criteria to tests, therefore the following practical suggestions are offered. First, the manual accompanying the test should be read carefully to see what the test claims to measure. Usually this is stated clearly and concisely, but it is surprising how well some manuals conceal this vital information. Second, the test should be looked up in some reliable guide,[3] or in periodical literature if it has been published recently, to see if it has received the critical evaluation of an expert. Much valuable information of this type is available concerning the best known tests. In this connection it should be emphasized that an unusually large number of books on tests are badly written and merely rehash subject matter already available in original standard books on the subject. Many of them are not worth the teacher's time. She should consult well written critical volumes by recognized experts who have amply demon-

[3] For example, *see* the table of reliability coëfficients given on p. 472 of Monroe, DeVoss, and Kelly, *Educational Tests and Measurements* (Houghton Mifflin Co., revised 1924).

strated their ability. Among the best guides in this connection are: Monroe, DeVoss, and Kelly, *Educational Tests and Measurements;* Hines, *A Guide to Educational Measurements;* Ruch and Stoddard, *Tests and Measurements in High-School Instruction.* The latter volume contains an excellent rating scale for judging tests (pages 45-48). Third, regardless of claims made, the test should be analyzed carefully in terms of a pupil's probable mode of responding. That is, try to determine as well as judgment permits whether the test actually measures what it claims to measure. Many tests claiming to measure problem solving or judgment, actually test memory and nothing else. Fourth, try the test on a class or on a few pupils and analyze the results. In some instances, have individual pupils work tests aloud so that the process may be followed by the entire class.

If the test seems actually to measure a desirable educational outcome, it is a good one for ordinary purposes. Teachers need not be confused by classifications of tests into *rate, power,* or *quality groups.* Disregarding these, analysis should be directed at discovering the relation of the test to a given learning product, that is, a given motor skill, clarity of ideas, memorized associations, special abilities, problem-solving skills, understandings, etc.

Advantages and limitations of standard tests. The chief advantages of the test lie in the facts that they are (1) ready-made, (2) easy to give, and (3) easy to score. They are thus (4) economical of time and energy. They are (5) distinctly more objective than the essay-type quiz. A norm or standard (6) is provided which is fair comparative measure for groups of approximately the same social, economic, and intellectual background. To the extent that the tests are well constructed, these points hold. As was noted above, some are not well constructed and do not measure what they purport to measure. Sometimes they may

measure the proper learning product but only unimportant or trivial phases of it.

The chief disadvantage of the tests, one which has been widely emphasized is (1) that they may cause the teacher to stress facts and skills as ends, memory and drill as processes. There can be no doubt that the danger exists. One of the chief points in the present discussion is to emphasize to the student the fact that while standard tests are excellent instruments, they measure, with a few exceptions, chiefly facts and skills. They are (2) not complete measuring instruments, and the teacher should be keenly aware that she must herself devise tests for other learning products. They are (3) not always absolutely accurate, and (4) do not always measure what they purport to measure. In high school there is the additional limitation that educational objectives are not so simple, easily defined, and agreed upon as in the elementary school. Standardized tests are, therefore, much less valuable.

The composite battery test. Because a single test measures but one phase of learning, and because scores from different tests and several subjects are difficult to combine, there have been devised batteries of tests designed to be used together. Constructed so that tests in various subjects harmonize, the scores may be combined into a single index or readily compared, each with the others, in terms of a common scale. The separate tests, reading, arithmetic, history, sentence meaning, etc., thus specially constructed with reference to each other, are bound in one booklet making for ease of administration.

Tables of norms have been prepared in terms of *subject ages* (S.A., more commonly R.A., reading age, A.A., arithmetic age, etc.), that is, the score which is normal for a given age. The score made by any pupil is compared with the table of age norms to determine the standing of that pupil. Since these norms are in terms of the same unit

and from the same zero point, they can be manipulated, like denominate numbers, arithmetically. Thus there may be derived the pupil's *educational age* (E.A.), by averaging his age rating in the several subjects.

Comparison of actual achievement (subject ages) with potential achievement (as indicated by I.Q., or by mental age) is easily made. At least one of the battery tests (*The Illinois Examination*) contains an intelligence test as part of the instrument. At this point we may note that practically all ordinary techniques for measuring fail to interpret results in terms of the general intelligence of the learner. All pupils, bright, average, and dull are judged, with reference to the same norms. Age norms, particularly mental age norms, are, therefore, superior to grade norms. Teachers have, of course, always attempted to consider this but, of necessity, had to proceed subjectively. Effort should constantly be made by individual teachers to refine the necessarily subjective judgments of pupil achievement in relation to potential achievement. With standardized tests which permit relating actual to potential achievement, there results the *achievement quotient* (A.Q.) or as some label it, the *achievement ratio* (A.R.). This gives a partial measure of how well the school and other educative influences are enabling pupils to realize on their native endowment. It is recognized, of course, that there are extra-educational and extraintellectual factors involved in achievement. The latter including amount, direction, and persistence of effort are emotional and volitional, and are not easily evaluated. However, an achievement quotient well below 100 notifies the teacher that the pupil is not doing as well as may be expected. The case calls for diagnosis.

The tests and derived scores discussed in the immediately preceding paragraph, are extremely valuable in administrative and diagnostic procedures, but this is not our concern

here. For the moment we are interested in them as economical and reliable measures that are more adequate than single subject tests.

Informal objective tests, or "new" examination. The second great improvement in testing memory and automatic association is to be found in the so-called "new" objective examination. These are in various forms and obviously modeled after the standard tests, but constructed by individual teachers or committees to fit given classes and texts. Ruch and Stoddard [4] have classified the simple types as follows:

1. *Recall types*
   - *a.* Simple recall questions
   - *b.* Completion exercises
2. *Recognition types*
   - *a.* Multiple response
   - *b.* True-false
   - *c.* Matching exercises
   - *d.* Best answer, or judgment tests
   - *e.* Identification exercises
   - *f.* Rearrangement tests

Other authorities differ slightly in arrangement and terminology, but the above list is essentially correct. Before discussing such tests in general, we may illustrate the various types. Lists of simple recall questions are much like the more elaborate completion tests:

1. Eli Whitney is noted for the invention of the..... _____
2. The fundamental economic cause of the Civil War was ..... _____
3. The Acts of 1867, by which Congress forced negro suffrage on the South, were called..... _____
4. Large corporations, when consolidated, are popularly called ..... _____

[4] Ruch and Stoddard, *Tests and Measurements in High-School Instruction* (World Book Co., 1927).

The blanks to be filled in are aligned, making scoring easy.

The completion test takes the form of sentences, or preferably paragraphs, with words and clauses omitted that must be supplied by the pupil.

In the south of the islands the inhabitants raise ....., while in the ..... the chief industries are ..... products and ..... and ..... Turnips are raised without much ..... They are raised as ..... for the .....

The multiple response tests present a question and a number of prepared responses from among which the pupil selects the right one, or several right ones.

Underline the word which makes the correct answer:

1. Varnish is thinned with
   gasoline alcohol linseed oil turpentine
2. The strongest corner joint for drawer construction is
   half lap miter dado dovetail

Sometimes more than one right answer is to be selected:

1. *Draw a line under* the name of each product that is exported from Ireland.
   Iron bacon peat milk wheat butter oats bogs
2. *Draw a line under* the names of cities that are capitals of states.

Kansas City	*Montpelier*	*San Antonio*	*Washington*
Boston	*New York*	*Newark*	*Montgomery*
	Lincoln	*Atlanta*	

The true-false test presents a numbered list of statements which the pupil is to mark *true* or *false* as he decides after reading. There are several variations in method of marking but the one illustrated is a common one. Later variations, for instance, provide for *doubtful* or *do not know* as answers when the pupil is uncertain or ignorant of the facts involved.

1. A good system of free public schools had been established throughout the North by the beginning of the Civil War ..... *True-False*
2. The Embargo and Nonintercourse Acts failed to protect the trade of the American colonies... *True-False*
3. The attack on Fort Sumter helped the Northern people, for it united them as they had not been united before ..... *True-False*
4. The South favored the protective tariff because it was largely benefited by it..... *True-False*
5. Both President Grant and President Johnson stood trial of impeachment..... *True-False*

Matching tests are easily understood and usually intrigue the interest of the learner. They can be easily devised by the teacher.

In front of each item in *Column II,* write the number of the city in *Column I,* to which the item refers.

Column I		*Column II*
1. Los Angeles	——	Famous fish canning center
2. San Francisco	——	A famous health resort
3. Spokane	——	Metropolis of Southern California
4. Portland	——	One of the oldest cities in the section
5. Seattle	——	A wheat milling center
6. San Diego	——	One of the best harbors in America
7. Tacoma	——	Center of the oil district in California
8. Astoria	——	Both a seaport and a river port
9. Bakersfield	——	An important smelting center
10. Sacramento	——	Largest city in Washington

Some writers differentiate a best answer test from the multiple choice, stating that in the best answer type, judgment is tested in differentiating between a right answer, partially right answers, and wrong answers. The student is to check the best answer in each case. If in addition he is asked to check the definitely wrong answers, judgment is more certainly called upon.

1. The chief function of the white blood corpuscles is the
   —— destruction of disease germs in the blood
   —— carrying of oxygen to the tissues
   —— carrying of food materials to the cells of the body
2. A vein is best defined as a blood vessel carrying
   —— the blood going to the heart
   —— the "blue blood"
   —— the "impure blood"

The rearrangement test consists of lists of items which are *scrambled*—written down without regard to sequence, causal relationship, or any other connection. The student must sort them out.

Number the following inventions in the order of their making:

—— The printing press	—— The cotton gin
—— Gunpowder	—— The automobile
—— Wireless telegraphy	—— The steam engine
—— Engraving	—— Arabic numerals
—— The telephone	—— The mariner's compass

All such tests represent economical and relatively easy methods of testing memory. When carefully made, some of the tests can be used to examine judgment and understanding.

Advantages and limitations of the "new" type objective examinations. Quite obviously these tests may be made (1) nearly or entirely objective, thus (2) making scoring easy and accurate. A much more (3) adequate sampling of knowledge is possible than with the essay-type tests, and (4) the pupil must deal with the items presented. With the essay questions he can juggle the situation and make out a case from information he has on hand, if he does not have what the question really calls for. Such tests are (5) readily adaptable to special conditions. Like any other type of test, they may be used (6) for either testing, teaching, or diagnostic purposes.

The disadvantages are (1) that they take some time and

skill to construct, but doubtless results justify this. Little opportunity (2) is given to test things other than memory or skill, and there is thus a tendency (3) to stress facts. There is some opportunity (4) for guessing, but this can be largely circumvented through careful construction of the questions. A disadvantage to be found in some situations only is that (5) a mimeograph or hektograph is necessary.

While some forms look to be easily constructed, care must be used with all of them. Each has its individual problems and pitfalls. Excellent discussions of procedure in constructing and using these classroom instruments are to be found in Orleans and Sealy, *Objective Tests;* Russell, *Classroom Tests;* and Ruch and Stoddard, *Tests and Measurements in High-School Instruction.*

Supplementary assignment. It is not the province of the present general volume to go into details of test construction. However, if detailed discussion of these informal objective tests is not available in other courses, the instructor may wish to go further. Assignment should be made to any of the three books noted above, so that principles of construction and rules for scoring may be understood. Then practice may be given in constructing examples, though perhaps not all of the types may be studied so intensively. This should receive detailed attention again in later special-method courses.

Testing understanding and problem-solving skills. The traditional essay-type examination has been used to test both memory and understandings and mental skills involved in problem solving. As stated in earlier pages, the testing of memory is doubtless better cared for by standardized or informal objective examinations. The essay-type test, properly constructed and administered, has a place in testing the processes of reflective thought. The severe criticisms of recent years have brought about marked

improvement in this type of examination. The following suggestions for improvement will at the same time indicate the chief criticisms.

1. *Construct questions specifically designed to test a given learning product.* Examiners are not always clear as to the outcome to be measured. Is the examination to test for memory of facts, for reasoning power, for understanding, for attitudes or ideals, or for a special ability? The traditional teacher has given little thought to this vital factor. The time and trouble must be taken to frame questions which do, in fact, test as directly as possible a given identifiable learning product. Real ingenuity and ability are called for and the dullard cannot do the thing successfully. In general, the essay type, as has been stated, should not be used for testing memory of facts, except of an organized and extensive sort. Ordinary memory is better tested by the standard tests or informal objective examinations. Catch questions should be avoided for reasons made clear in Problem 2 of this unit.

The statement is commonly made that examination questions should be in line with accepted educational objectives. This means, in other words, that only worth while outcomes be tested. This requirement is cared for by the rule advanced in this paragraph. It is assumed that the given identifiable learning products to be tested will have gained their place in school in the first place because of their worth. If the ends of learning are properly conceived, to test for them will ensure that the examination agrees with educational aims.

2. *Construct questions that can be solved only by exercise of the designated learning product or process, and not by another which might be substituted.* Little discussion is necessary here. The entire emphasis of this volume has been upon the proper differentiation and definition of the real learning products. Misconception of, or confusion between, learning products and their applicability to situations, as discussed in Problem 3, Unit I, is the error to be avoided. More specifically, for example, do not designate as a *thought* question one which can really be answered from *memory*.

3. *Construct questions dealing with equally valuable items, or assign differing values to the several questions.* Very often questions are asked which deal with important and complex items from

the course, while others in the same examination may deal with unimportant, even trivial items. The questions are, furthermore, often assigned equal value. Certain recent investigations do seem to indicate that weighting exercises has little effect on final relative grading. For pedagogical purposes in making up the test it is, nevertheless, vitally important that teachers recognize the fact that valuable and basic items should be included, rather than minor and supporting detail.

4. *Make an effort to sample adequately the product, or to cover adequately the functioning of the process being tested.* This rule is related somewhat to the preceding one. If enough basic questions are asked, it is probable that adequate sampling will take place. It is possible to have a good list of questions, all dealing with important items, but confined to only a few of the understandings being tested. Teachers often trust to memory or to last minute inspiration for examination questions. Consequently, the content of examinations is not always well chosen in regard to adequately sampling the course. Furthermore, examinations are frequently made up of questions from a number of fields, instead of strictly from the one field to be tested. The wide range of topics makes for indefiniteness in measuring learning.

5. *Make questions clear and definite as to import and meaning.* As indicated previously, "discuss" or "tell-all-you-know" questions had perhaps better be avoided. Questions that are vague, involved, or that include too much explanatory or related material should not be used.

6. *Set up standards, as definite as possible, for evaluating the answers.* Quite apart from the effect upon grade, it is necessary to analyze both question and answer as objectively as possible, in order to ensure that both deal with the learning product being measured. Teachers should determine specifically just what is desired in the answer. What is desired should be equally recognizable by other readers than the teacher. A good device is to list the ideas that should appear in the answer, to list the processes that should be evident, to list the indications that the processes have actually functioned, etc. Another good device is to write out a model answer to all proposed questions. Many questions would be rejected for examination purposes if the teachers proposing them would attempt to answer them before using them on a class!

7. *Consider both rate and ability when both items are con-*

cerned. Ordinarily, speed may be tested by giving a list of exercises of equal difficulty, but so long that no one can finish within the time limit. This spreads the class as regards rate of procedure. Ability may be tested by giving a list of exercises of increasing difficulty, and letting each pupil proceed until he is unable to solve any more. Granted that the exercises all illustrate a given understanding and skill in the use of it, and that degree of difficulty has been actually determined, this gives a test of power or ability.

The construction of questions which will actually test understanding and the problem-solving skills is distinctly difficult, requiring the best ability the teacher has. The above suggestions care for the more obvious features only. If a glittering generalization may be permitted here: Questions should not be directed at information, but at the solution of situations which necessitate application of the knowledge. Students often object to such questions but they are, nevertheless, the best type. A college class, for example, was asked, "In the light of our criterion for scientific judgments, criticize the conclusion reached by the Chamber of Commerce in its recent controversy with the faculty," and objected strenuously. A majority of the class stated that if the question had called merely for restatement of the criterion involved, understanding would have been demonstrated. To apply it to a real situation was no part of the game for them. Another class was asked to apply five principles which had been developed in class, to a given specific situation. They objected, saying that a question asking them to restate the five principles was the proper type of test to give. To be asked to recall and also to think was too much. However, questions which assume material developed during learning periods, and which call for application to new situations should be sought and used by teachers.

The summary questions in this volume represent the efforts of several instructors and many students over a

period of years to devise test questions which would actually test understanding and mental skill, rather than mere memory. Some of them fail, others are poor, but quite obviously a large number of them can be answered only by those who really understand the principles involved (See Exercise No. 3 at the close of this discussion). It is very interesting to observe traditional-minded students, both undergraduates and experienced teachers, attempting to answer some of these questions on the basis of time-honored stereotypes, instead of on the basis of the new response advocated in the text material and developed during study of the given unit. Asked to state the basic understandings or principles derived from a unit, they insist on presenting a lengthy and detailed outline of all facts, illustrations, cases studied, referred to, or even mentioned in the unit. On the other hand, the student who actually understands the new point of view is literally unable to present the traditional answer type for the problems.

The true-false and best-answer tests can be used to examine understanding and judgment, but the utmost care must be used in construction [5] or they become memory tests. To test understanding or judgment, a situation must be set up in which the student may choose between the right, the nearly right, and the wrong, and in which he cannot select the right answer unless he truly understands the full implication of what he has learned. An even better form is to present (in the best-answer list) two definitely wrong answers, two that are true in general or in part, and one which is clearly the best answer to any one who has really acquired the desired learning response. Furthermore, the student should be asked to mark, not only the

[5] In addition to the three books mentioned earlier in this connection which discuss the new-type examinations, *see* W. H. Burton, "A Contribution to the Technique of Constructing Best-Answer Tests," *Elementary School Journal,* Vol. 25, June, 1925, pp. 762-770.

right answer but, contrary to common practice, to designate also the wrong answers.

Another valuable testing device in the content subjects is to require the written presentation of a coherent organized argument. Preferably this should be assigned for completion outside of class. The assignment may be the organization of material from several sources into a coherent sequence leading to a conclusion; it may be the reproduction and criticism of a difficult involved argument presented by one source; or it may be the critical reaction to a number of sources. Standards for grading should be clearly explained, and classes should be given enough of these papers so that reaction to them becomes natural and typical. Grading should be based chiefly upon two things, first, evidence of understanding, and second, evidences of ability to select, organize, criticize, and present material in a coherent manner. The latter is obviously an adaptation or response other than the one primarily tested, but both are valuable and are functionally related. Provided that all understand that both items are to be tested, there is no unfairness.

Morrison [6] discusses a procedure which he calls *rapport testing*. He admits that it is, "subjective, uncertain, and insufficient . . . mere guesswork when not accompanied by objective testing." Nevertheless he believes it to be a desirable accompaniment of both teaching and objective testing. As the name indicates, it means keeping *en rapport* with the learner and being able to note quickly that he has or has not the desired understanding. This involves intimate give and take in discussion, using and calling for explanations and personal illustrations. It especially involves noting various reactions, unintentional as well as intentional, which may indicate the pupil's inner state. Some

[6] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), pp. 251, 293.

teachers become remarkably sensitive to the learner's actual state of mind, others never seem to see any but obvious, striking indications of understanding or the lack of it.

Testing emotional response. The problem of testing enjoyment, appreciation, standards of taste, ideals, or attitudes toward conduct is as yet unsolved. There are, however, pupil activities that can be observed which will indicate whether or not such learning products are being acquired, even though the exact nature and extent cannot be measured. When students whistle or hum tunes they have had in class, when they manifest a growing interest in better types of stories and pictures, when they attempt crudely to imitate some of the things given, results are being obtained. The record cards kept by pupils listing their free reading, together with their reactions to this reading, supply legitimate evidence for judging the growth or nongrowth of enjoyment, taste, or appreciation. Ideals and attitudes toward conduct probably cannot be tested, but their presence or absence can be inferred by watching the everyday conduct of the pupils. These things cannot be legitimately tested by setting up theoretical situations for which the pupil must describe the desirable conduct response. Most normal students can tell immediately what the morally desirable response is, but that is no guarantee that this will be the actual response when confronted with a real situation in life. Such questions are really problem-solving tests and not tests of these emotional learnings. The only reliable evidence is to be derived from observation of conduct and activity. This should be compiled cumulatively upon the pupil's record card. Personal reports, mentioned in later pages, supply the evidence which is valuable here.

Testing under the mastery theory. When discussing the nature of learning it was noted that Morrison, differing from the traditional view, holds that there are no degrees

of learning except for skills. The student has the desired learning product, or he has it not. One pupil may take three times as long as another to acquire a given adaptation, and may be slower in working out applications, but both have the adaptation. The difference is in rate of learning or reaction time. Granted that the adaptation is normal for the learner's level of maturity and interest, granted that a valid test exercise is used, evidence is derived, according to Morrison, showing that the learner has the adaptation and can use it, or that he has it not and cannot use it. For instance, problem-solving involves understanding of the process, adequate data, and skill in the use of both. The skill may show degrees, specific information may be present or lacking, but for the basic adaptation of understanding of the process or processes involved there can be no degree. The student either knows how to go about solving problems or he does not know how to go about it.

Obviously some confusion might arise in trying to relate testing as discussed in the foregoing pages, to testing under the mastery theory. This will not result in confusion if the theory of *unit learnings* is understood. If the learning products can indeed be divided into basic elemental units, each truly unitary, then it is quite correct to say that the pupil has or has not the given learning product. As stated earlier, this theory is based upon the assumption that the outcomes of education can be stated in terms of definite attitudes, understandings, appreciations, abilities, and skills to be acquired, and not in terms of courses and books to be covered, facts to be remembered, exercises to be worked, examinations to be passed, etc. The traditionalist who sees the learning process in terms of courses, books, and facts cannot understand, not to mention use, the theory of unit learnings. For him there are degrees of learning. The good teacher, on the other hand, can take the traditional

course of study, books, and courses and construct units, but the outcomes will be quite different. The traditionalist will test for remembered facts, will accept as evidence of learning the working of examples, the completion of books or courses. The teacher of units will first list for teaching and testing the definite understandings, attitudes, abilities, and skills which should have been developed out of the texts and courses studied.

The chief difficulty would seem to arise then, from misunderstanding and misapplication of the terms *unit learning* and *mastery*. As an illustration may be cited the confusion caused in a large city recently over *mastery* of arithmetic fundamentals. One hundred per cent accuracy or *mastery* was insisted upon in the number of combinations and in all computational exercises. This is obviously impossible. These automatic associations, necessary for the functioning of the adaptations involved, necessitate memory and skill. Skill quite clearly shows degrees and may even vary from day to day. There is no adaptation, *unit learning* here to be mastered. The real unit learnings were lost in the confusion. One of them probably was, let us say, addition—recognition of situations to be solved by addition, understanding of the process, and desire to use it when it is the proper response. That adaptation—recognition of addition situations, understanding of the process, and desire to use it—can be mastered by any normal pupil, but probably no human being could ever attain absolute accuracy in the computational skills through which the adaptation would function.

Taking true examples of unitary adaptations, it is difficult to see how they can be "partly acquired" or "forgotten." To illustrate, the student who actually understands the atomic theory, the germ theory of disease, the doctrine of evolution, the principle underlying the solution of problems involving unknowns, has acquired modes of

viewing life and of reacting to situations. If he behaves otherwise, he has not acquired the understandings involved. He cannot "forget" them, though he may later substitute other adaptations for them. Similarly with the student who has actually acquired a standard of taste in literature, a correct attitude toward conduct, an understanding and appreciation of taste and color combination in dress or interior decoration.

The test of learning, according to Morrison, is in the permanency and habitual use of the learning response in ordinary activities of life. This indicates very clearly that the final and conclusive test for many learning responses must wait upon real-life situations. Nor is this nearly so revolutionary as it sounds, since the same statement should hold for any modern theory of learning. Morrison quite definitely recognizes the necessity and possibility of testing during the school period; in fact, several of the suggestions in the foregoing pages are adapted from his discussion. *The real difference between Morrison and the traditionalist lies, not so much in the problem of testing, as in defining the nature of the thing to be tested.* The traditional examination, according to Morrison, tests the means and not the end. It deals largely with the facts, items, details, processes, out of which real learning response should develop. It does not deal with mastery because there is nothing here to master. It tests, finally, not whether the student learned, but whether he did those things out of which learning should develop.

At this point we may examine briefly one of the evidences which Morrison [7] submits to show the contradictions and confusion resulting from testing daily preparation, facts, study questions, and then attempting to interpret the results as evidences of learning. What might be the formal

[7] *Op. cit.*, p. 41.

grammar records of two students in the same class are shown in the following table:

Topic	Pupil A	Pupil B
1. Parts of speech	81 passed	72 passed
2. Elements of the simple sentence	90 passed	78 passed
3. Adjective and adverbial modifiers	50 failed	71 passed
4. Phrase modifiers	74 passed	73 passed
5. Gender	85 passed	70 passed
6. Number	82 passed	79 passed
7. Person	94 passed	76 passed
8. Case	89 passed	75 passed
9. Tense	75 passed	70 passed
10. Relative clause	63 failed	71 passed
11. Compound sentence	58 failed	70 passed
12. Participle	77 passed	71 passed
13. Infinitive	42 failed	72 passed
14. Transitive and intransitive verbs	56 failed	70 passed
Average	73 passed	73 passed

For ease of discussion we may assume that each pupil during the course had one hundred chances to respond to questions involving the items listed. Both receive identical grades, which being passing grades are accepted as evidence of satisfactory proficiency in the given items of formal grammar—evidence that learning has taken place. But, specifically, what learning?

One pupil passed in all fourteen items, the other failed five of them, but both receive the same grade. Is the learning then the same in each case?

One pupil has no grade higher than 79 and none lower than 70, the other has two over 90 and five lower than 50, one, in fact, of 37. Both get the same passing grade. Can excess learning in understanding of simple sentences compensate for failure to understand the relative clause? Obviously real learning is not involved at all. The teacher failed, doubtless, to define clearly just what learning re-

sponses—understandings and abilities—were to be derived from reading, discussing, using, writing about the fourteen items. Without clear recognition of what is to be learned, certainly learning cannot be tested. The tests dealt with facts, details, drill problems, faithful preparation of daily recitations, and not with learning at all.

As illustrated here and stated before, the difference between Morrison and the traditionalist is in the definition of what is to be tested. The widespread discussion of Morrison's writing has caused an invaluable attention to, and emphasis upon, the real nature of learning responses, and upon the necessity of testing directly for these and not for subsidiary things that have been involved in the learning process.

In the last analysis, there is no fundamental difference between testing for mastery and testing for the learning responses advocated in this volume. There is some difference regarding the legitimacy of certain learning products, as, for example, memorized material. Modern teachers everywhere must agree that we should test the true learning response directly, and not the subject matter, the assimilative material, nor the performance of learning activities. This really means, as has been stated many times, that tests must be carefully constructed for definite ends, and that those ends must be legitimate learning products.

Routine items. In any event and whatever types of tests are used, certain routine items should be cared for. Preferably question lists should be mimeographed or typed so that each student has a copy. If the blackboard must be used, writing must be plain, and explanations should be given. With either mimeographed or blackboard questions, it is probably well to read all questions over with the class before work starts. Questions may be asked and explanations given. Students desiring legitimate explanation later

should receive it individually so that others may not be disturbed by open discussion. General directions as to form of paper, type of outline, or other formal devices used, should either be definitely noted on the mimeographed sheet given the students, or explained clearly before work starts.

A great deal has been said about the so-called surprise test. The argument that such a test reveals more truly the extent of the student's knowledge, is balanced by the one that any of several temporary handicaps might prevent the student from truly demonstrating his knowledge. If real understanding is the result being tested, it would seem that tests should be announced in advance. Even better is the practice of constructing such questions that they may be taken from the classroom and worked upon for a week. Group work among students is permissible. Good check questions given later will prevent students from merely copying from a group leader. The danger of cramming can be avoided by the use of questions that call for analysis and real understanding which cannot be acquired in a brief preparation period. On the other hand, brief formal tests calling for often used, fundamental facts that are involved in all parts of the subject, may be given without warning. They are not so much testing as teaching devices. Care should be exercised to see that the facts called for are actually fundamental and sufficiently important that students may legitimately be expected to know them. The "new" examinations already discussed will serve this purpose.

Finally, whether extensive formal tests announced in advance, or short memory quizzes given without warning are utilized, the extremes of too little and too much testing must be avoided.

The validity and reliability of examinations. Most treatments of testing contain much discussion of validity and reliability, together with statistical data concerning these

items. The statistical formulas for computing the *coefficient of reliability* and the *probable error* are usually given. As stated in a footnote in earlier pages, this volume deliberately omits much detailed discussion of statistics. For standard tests, the coefficients are usually available in the manual. For most ordinary school examinations such computations are not worth while, nor can the ordinary teacher make them. For practical purposes, a simple statement of validity and reliability is desirable. It is important to know what causes tests to be invalid and nonreliable.

A test will be a *valid* instrument if it (1) actually gets performance that is symptomatic of the learning which is being measured, (2) performance which is not based upon the functioning of other learnings than the one being tested, (3) performance which is a fair sample of the entire field or function of the learning being measured.

Even though *valid,* a test may be unreliable. This is due to (1) the inherent variability of human nature, (2) lack of control over test conditions, (3) failure (on a given occasion) to get functioning of the thing being measured even though the test be valid, and (4) to the inevitable subjectivity in describing the performance of the learner. To be specific, the first point means that a child may do well to-day, and badly to-morrow. Conditions surrounding the test, such as health, immediate physical comfort, activities preceding the day of the test are not always under school control. The third point is usually due to some combination of the first two. The fourth is self-explanatory. To be *reliable,* a test must give approximately the same result each time it is used. If two forms of the test are available, both forms should give about equal results.

Objections to and reasons for examining. Up to this point the discussion has proceeded upon the assumption that examinations are a necessary and accepted part of the school procedure. There are educationists, however, who

object and who would distinctly minimize, if not abolish, the examination. In the foregoing pages a number of criticisms of tests have been stated or implied, relating chiefly to the content, make-up, and validity of examinations. Other objections relate to the time and effort necessary to construct, give, and score them. Such difficulties are largely unavoidable. Much time and effort may be saved by using standard tests and "new" type examinations where these are applicable. More extensive written examinations are desirable as one part of the scheme for measuring outcomes, particularly in testing understanding and problem-solving skills. As stated in Unit I, teaching is an intricate and difficult type of work requiring time, brains, and effort. Constructing high grade examinations merely illustrates this point further.

Another objection often raised against traditional examinations, and against other types as well, is that they are a serious strain on the pupils and even definitely injurious to health. Few sillier objections to school procedure are ever made than this. On the college level, the students who can dance until dawn, practice night after night for the college play, or go through grueling training for athletic contests make a poor showing in stating that a forty-minute written examination completely exhausts them. Parents who allow children to stay up till all hours, who allow them to violate many rules of hygienic living, and who allow them to eat irregularly have no standing in court when they assert that one written examination is dangerous to the child's health. "But," the student may say, "I get so flustered and excited that I wear myself out and cannot think. I do not do as well as I really can." All the more reason to take examinations in order to conquer this lack of poise and control which interferes with good performance. The ability to meet simple tests and crises is a legitimate learning outcome, and *any normal*

student can acquire it. That an examination upsets one is a confession of definite weakness and instability, and not a reason for abolishing examinations. In fact, a little excitement over an examination, if it does not become tenseness, is distinctly beneficial.

A related objection is to the effect that examinations are not typical of life. The direct opposite is true. Life constantly tests one's abilities, skills, and understandings. Hardly a day goes by, except for the routine worker, in which situations exactly comparable to tests do not arise. Furthermore, life is much harsher than the school in setting examinations. An individual may receive a severe test of his uttermost power and ability late in the afternoon of a hard day. He cannot avoid it. The demands of his chief, or of the business in which he is engaged, force him to display his ability in solving a technical problem or in handling a situation which has arisen. He may have been ill the day before, he may have had a severe headache all day, but if he is on the job the demand is presented, and he cannot avoid the test. The school at least will excuse him if ill, or will arrange for a make-up or second trial if legitimate excuse is presented.

As a matter of fact, these last objections to examinations are probably based upon experience with traditional memory-type tests. The cramming and last-minute "boning" for such tests doubtless was an undue strain. This was as much the student's fault as that of the test. When real learning products are defined, and when teaching is organized around them throughout the unit, testing should be continuous and formal tests appear as a matter of course, being regarded as naturally as supervised study, library work, or oral recitation. If the student has really been learning as he went along, the examination cannot unduly upset him.

A fair analysis of the various objections to examinations

seems to justify the conclusion that there are no fundamental arguments against them, but that there is ample ground for complaint against poorly devised tests and unorganized, inflexible examination procedures. This is readily granted.

Some objections to examinations are not honest, but are motivated by a desire for peace and harmony undisturbed by arguments with parents and pupils over failures, low grades, nonpromotions, etc. A few individuals, perhaps, merely wish to avoid the work involved.

The uses of, reasons for, and real value in examinations are apparent to any fair-minded and competent analyst of the learning situation. Testing is as necessary in teaching as accounting in business, evidence in a court, or as proof of efficacy after medicine has been administered. In general, testing is necessary (1) to discover whether the teaching has been effective, or better perhaps, to see if the pupil learned, (2) to diagnose group and pupil difficulties and shortcomings in learning so that teaching may be redirected, and (3) to supply data (together with other procedures) for routine administrative purposes, (*a*) school records, reports to parents, and (*b*) grouping pupils for instruction. The last purpose is not our concern in this course, the second will be discussed in Problem 5, this Unit, while the first has been the concern of the preceding pages.

Discussion Questions for Summarizing and Testing on Problem 3

1. We wish to determine whether a student has really acquired a thorough understanding of the doctrine of evolution—not merely the evolution of man but the doctrine as a basic method of viewing the world and affairs. Forget the traditional school test of information. How might we tell from the everyday responses of an individual that he understands the evolutionary or developmental point of view?

2. How could we tell by observing the ordinary activities of a high-school girl that:

a. She *understood and desired to apply* dietetic principles discussed in her home-economic courses? Or did not understand?
b. She *understood and desired to apply* principles involved in design, or in household decoration?
c. She *understood* the remarks of a lecturer regarding the importance and significance of choosing a life work and preparing for it?

3. Go over the summary questions presented at the close of the various problems in this volume. Recall or discover one that in your judgment does not actually test the understandings involved, one which is fair, and one which quite clearly is an adequate and reliable test of the learning to be derived from the problem, telling why you make your decision.

The foregoing are designed to focus your attention upon the evidences of learning. The last one brings the matter closer to school testing. The following question is one of the most important in the entire volume and should demonstrate the student's ability or lack of it rather surely.

4. Come to class prepared to illustrate definitely the testing of a given learning result. Use any subject matter desired, preparing an actual illustration—a test exercise.

Be careful to select a true learning result. State it definitely, perhaps describing briefly the general nature of the subject matter out of which it should grow. Then show that your test exercise is a valid test for the possession of that learning, and that the pupil cannot answer your question without being possessed of the learning.

Memory and skill can be disposed of quickly. The major part of the discussion of this question should center around the testing of understanding, or some of the mental skills involved in reflective thought. It is doubtful whether emotional learning should be "tested" in this manner.

5. What kind of learning is being tested by the foregoing question?

6. Bring in questions which you have met in essay examinations in various subjects and at various times, being ready to show that they meet or fail to meet the requirements for good testing instruments.

7. What are probably the chief pitfalls to be avoided in "sizing up" a student's daily performance?

Parallel Readings for Problem 3

1. Douglass, H. R., *Modern Methods in High-School Teaching* (Houghton Mifflin Co., 1926), Chs. xii, xiii, xiv.
2. Hines, H. C., *A Guide to Educational Measurements* (Houghton Mifflin Co., 1923).
3. McCall, W. A., *How to Measure an Education* (Macmillan Co., 1922).
4. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Chs. xv, xvi.
5. Monroe, DeVoss, and Kelly, *Educational Tests and Measurements* (Houghton Mifflin Co., revised, 1924).
6. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926). Use index.
7. Odell, C. W., *Traditional Examinations and New-Type Tests* (Century Co., 1928).
8. Ruch, G. M., and Stoddard, G. D., *Tests and Measurements in High-School Instruction* (World Book Co., 1927).
9. Orleans, J. S., and Sealy, G. A., *Objective Tests* (World Book Co., 1928).
10. Russell, Charles, *Classroom Tests* (Ginn & Co., 1926).
11. Starch, Daniel, and Elliott, E. C., "Reliability of Grading High-School Work in Mathematics," *School Review,* Vol. 21, 1913, pp. 254-259. Presents facts showing a great variability of teacher grades.
12. Wood, B. D., "Measurement of College Work," *Educational Administration and Supervision,* Vol. 7, September, 1921, pp. 301-334.

PROBLEM 4

WHAT PRINCIPLES SHOULD CONTROL THE CONSTRUCTION AND OPERATION OF AN ADEQUATE GRADING SYSTEM?

Exploratory and Pre-Test Questions

1. What are the purposes of a grading system? List at least five or six. What is probably the chief purpose of grading?

2. Under what system do you prefer to be graded: a percentage scale from 0-100 with passing around 75? using letters A—B—D—etc.? descriptive terms, *excellent, good, fair,* etc.? Why do you select the system you do? Would you like to suggest some other system?

3. What does B or 83 really mean in French? in algebra? in constitutional law?

4. What suggestions would you make which might aid in cutting down the great variation in grades, similar to that in the case reported at the beginning of the previous problem?

5. What is the highest percentage of failures which ought to be tolerated in a class? What factors should influence your answer to the foregoing question?

6. What are the merits and weaknesses of what students call "stiff" grading or "easy" grading?

Reasons for grading. The results of examinations must be set down in terms of some standard or descriptive index, as must the results of other teacher estimates of the pupil's status in learning. There has to be some reliable basis for administration purposes. Hence a marking system of some sort is necessary. Some educationists would object to the term "necessary," asserting on the contrary, that marks or grades are not only not necessary, but distinctly detrimental. However, most arguments against marking are really based on experience with poor systems, or with inept handling

of a good system. Grades are quite necessary in the administration of education for the following reasons:

1. To furnish a simple system of administrative shorthand for routine purposes; classification, promotion, transfer, etc.
2. To aid in informing parents and pupils, particularly concerning progress and standing.
3. To supply data upon which (if desired) studies of comparative teaching efficiency can be based.
4. To stimulate effort.

The first three are self-explanatory. A caution must be voiced regarding the fourth. It may even be that this point is not a legitimate one. Grades, marks, or other insignia and awards, will unquestionably stimulate the learner to effort, but one of the chief objections to grades is that they become ends, that they stimulate the learner to work for them and not for real learning. This may even bring about detrimental learnings. Grades as devices are, like all other devices, useful and beneficial so long as they remain devices, dangerous and detrimental when they become ends. In the hands of good teachers, grades will not become magnified into ends. Furthermore, to the extent that grades are based upon, described, and are given only for true learning, it will not matter if they do become ends. Working for them exercises the process by which true learning is achieved. In other words, learning and its symbols should be described one in terms of the other. This emphasizes a point which will be stressed many times in the immediately following pages, namely, that grades should be more accurately descriptive of what they stand for, and that the objective description for each symbol be clearly in the minds of all concerned.

To repeat, grades are necessary as a convenient and effective system of symbols or administrative shorthand to facilitate certain purposes of the school. This is true despite obvious dangers and defects. To the extent that the

description of the grades coincides with the description of true learning, and to the extent that the grade is given only for true learning, will the dangers and shortcomings be avoided.

What grading procedure is likely to be reasonably foolproof? How may the teacher safely avoid the very real pitfalls in the operation of a grading system?

Shortcomings of traditional systems. The biggest objection as indicated above is not to grades, but to the fact that grades tend (1) to be an end in themselves, and worse (2) to be based upon things other than genuine learning. As long as grades are clearly understood to be merely handy symbols—a means by which to carry on discussion of pupil attainment—and in so far as these symbols are based on actual learning and not upon performance of learning activities, any system of numbers, letters, or terms will be reasonably safe. Some, however, are better than others. As indicated above, it is not the symbol, but the explanation of the symbol that is the important thing.

The common traditional percentage system will not stand up under critical analysis. Percentage can be used legitimately only when based on an actual known total quantity. This is obviously impossible in grading the learning responses of the pupil. What does 83 or B mean in arithmetic —that the pupil can solve (1) 83 per cent of all possible life problems in arithmetic, (2) 83 per cent of the limited and specific lists of problems handed out by the teacher for daily preparation or final testing, (3) 83 per cent of all the problems listed in the particular textbook? Obviously it means nothing at all. A percentage grading, however, when set down attains stability and finality.

Furthermore, the teacher inevitably and naturally falls into another error carried over from situations in which a percentage legitimately applies—that of averaging percentage grades given on different items into a total grade.

We saw in earlier pages how a student might secure a grade of 90 on one phase of grammar, 50 on another, and receive a final passing grade of 70. A good grade on one phase of a subject here compensates for clear-cut failure on another item. Because of averaging grades for various items, daily recitations, examinations, it is quite possible to attain a passing mark in courses, parts of which are entirely unknown to the student.

It should be noted here that while some difficulties are due to the inherent weaknesses of the percentage system, part are due to grading something else than true learning.

The same objections can be made to such symbols as A, B, C, D, E, or I, II, III, IV, V, particularly if the teacher, as is often the case, must base these symbols on numerical values.

By this time the bewildered student is doubtless asking what system of grades or marks can be used. The situation is not hopeless from the point of view of theory. From the point of view of practice, there are still very serious obstacles to better marking, consisting chiefly of traditional mechanisms, modes of thought, and the demands of brevity, universal currency, etc. Any new system will take time to become established. However, even now progressive schools have made considerable advances.

Essentials of a good grading system. The chief essential in a good marking scheme is simple to state but difficult to use. It is that the symbols used be clearly defined in terms of the learning product being graded. A corollary is that provision must be made for compiling and using rather extensive and detailed data which are, as far as human judgment can determine, reliable evidences of possession or nonpossession of the learning product desired.

Defining the symbols. Any symbols will do if definition is clear, explicit, and adequate. The items must be kept clearly in mind by the teachers. Symbols such as A, B, or

I, II can be so clearly defined as to be satisfactory, but are likely to lead the teacher eventually back into traditional modes of thought. It is better to use other symbols or to dispense with these distinctly handy devices, and commit one's self to a more detailed description of pupil status.

The practice of the laboratory schools at the University of Chicago illustrates both ideas. Under the theory of learning operative there, a pupil must actually master the unit learnings involved. On reaching this stage he receives a grade of M (mastery), and is determined ready for the next unit. If, in addition to mastery, he manifests a genuine and sustained interest in the unit, he receives an N, or MN. If, still further, he manifests unmistakable ability to proceed "self-dependently" to carry on activities of his own within the material, he receives an R. A student can thus receive either M, MN, or MNR, each descriptive of a certain definitely understood status. If desired, the student's scores in those subjects that may be measured largely by standard tests, may also be recorded on the pupil's card. It goes without saying, of course, that reliable indications of mastery, interest, or self-dependence must be known to the teacher and gathered constantly. This item is discussed in later pages.

In my own college courses, I have attempted to construct a grading system which is deliberately a compromise between the ideal and the necessary. Ideally, we should pass those students who actually acquire the unit learnings (in so far as we can determine genuine learning), and diagnose the cases of those who do not. The practice of the University demands grades of A, B, C, D, or F, and also that these be distributed in general relation to a local curve of probability, based upon campus procedure over a period of years. In my own adaptation, I explain to the students that to pass at all they must demonstrate mastery of the understandings, concepts, or principles to be derived from

the course. There are also to be derived from the course and from the discussion method of teaching, certain mental skills. Skills are learning outcomes which do, in fact, show degrees of power, and I base the differentiation between A, B, C, and D on the degree of skill in these items, as shown by class work and papers. An explicit description of each grade is made available to the student. Too long to quote, illustrative exhibits are given below. Each of the twelve points is carried through for each mark, and the various levels of skill desired are manifested by the underlined words.

To Receive a *D* Grade a Student Should

1. Answer readily and accurately practically all study questions based on the text or references, which are asked him during the course.
2. Turn in on time and in acceptable form all written papers based upon text or reference material, or interpretations thereof.
3. Recall readily facts from previous discussions and apply them to present questions.
4. Be able to derive the concepts, principles, or beliefs which are based upon a given unit of material.
   a. shown by ability to state them in clear-cut fashion.
   b. shown by ability to use them in solving new problems depending on their use.
5. Volunteer to answer *a few* of the class questions.
6. Follow the discussion of the class, volunteering *occasionally*
   a. to supplement an inadequate recitation.
   b. to criticize an inaccurate recitation.
   c. call for further explanation or interpretation if necessary.
7. Make a *few* original contributions to the discussion.
   a. Personal interpretations or illustrations.
   b. References to newspaper or magazine reading.
8. Be able to summarize *at least a part* of the assigned material in *simple, brief,* and *orderly* manner, manifesting *some* discrimination between points. Stated conversely, *avoid* muddle or confusion or noncontinuous discussion.

9. Be able to answer a few judgment questions accurately. Answers should be at least *continuous.*
10. Recognize general nature of suspended judgment. Avoid dogmatic or stubborn insistence on statements.
11. ———
12. ———

To Receive a *B* Grade a Student Should

1. Same as in D
2. Same as in D
3. Same as in D
4. Same as in D
5. Volunteer to answer *a very large number* of the class questions.
6. Follow the discussion of class closely, volunteering *immediately.*

   a. to supplement an inadequate recitation.
   b. to criticize an inaccurate recitation.
   c. a call for further explanation or interpretation if necessary.

7. Make a *very large number* of original contributions to the discussion.

   a. Personal interpretations or illustrations.
   b. References to newspaper or magazine reading.

8. Be able to summarize in *concise, effective* manner the assigned material; to present a *coherent, continued* discussion in which *nearly all* major and minor points are clearly *discriminated.*
9. Be able to answer *most* judgment questions accurately, with *intelligent* insight into the issues involved. Answers should be *organized* and *coherent,* with relative values of points *well discriminated.*
10. *Usually manifest* suspended judgment, recognition of the necessity of reliable data, willingness to modify beliefs when confronted with irrefutable facts.
11. Raise a *very large number* of concisely worded, intelligent questions concerning the issues under discussion; open the discussion on these questions *adequately;* show *keen* discrimination in accepting or rejecting suggestions, illustrations, data, or conclusions.
12. Carry on *many,* genuine self-initiated activities apart from

the requirements of the instructor—reading, observation, experiment, a written paper on a problem or problems which attract the interest.

Some of the terms are, of course, open to differing interpretations, but with careful preliminary analysis and definition, fair-minded instructors and students may achieve remarkable agreement in the use of such descriptive scales.

With the exception of the first three points, the other requirements refer to definite skills to be acquired, or to activities which are reasonably sure to beget genuine learning if carried through. The first three points refer to routine requirements and do not guarantee learning.

Sometimes attempts are made to construct explicit grading systems, such as those illustrated here, but the points included are not evidences of genuine learning, nor will their performance necessarily beget learning. For instance, the following are quite typical of items to be found in grading schemes, which actually fail to do what they set out to do.

Answer must contain (variously stated percentages) of the facts
Maintain good attitude in class
Satisfactorily prepare daily lessons
Maintain a good position while reciting—standing or sitting erectly
Avoid being tardy
Pronounce clearly and slowly

The pupil could do all, or practically all, of these items and still fail to learn. He is graded on performance of learning activities, and not on actual learning.

In those subjects where memory or skill is the outcome, standard tests are legitimate, and the score may be either translated into a grade, or used as a grade. In the latter case, the standard norm must also appear, so that the

pupil's score can be interpreted meaningfully. A graphic device [1] for showing a pupil's actual standing in standard tests results is to be found in the profile.

Excluding extraneous items. Johnson [2] shows that a large number of items in addition to achievement may en-

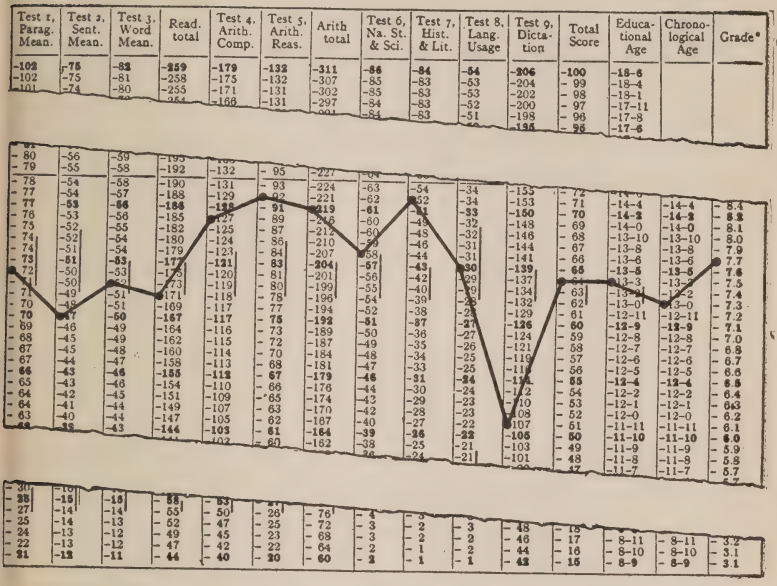

FIG. 5. EDUCATIONAL PROFILE CHART: ADVANCED EXAMINATION.

From Stanford Achievement Test, Manual of Directions, Copyright, 1925, by World Book Company, Publishers, Yonkers-on-Hudson, New York.

ter into the determination of a grade. Besides achievement in a subject, teachers listed a total of seventy-four items, including such things as effort, attitude, conduct in class,

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[1] "Educational Profile Chart," *Manual of Directions for the Stanford Achievement Test* (World Book Co., 1927), p. 51.

[2] F. W. Johnson, *Administration and Supervision of the High School* (Ginn & Co., 1925), p. 284.

originality, carefulness, attendance, home environment, co-operation, determination, etc.

Courtis [3] presents facts seeming to indicate that boys must do 14 per cent better than girls to get the same grades. A reasonable interpretation is that girls manifest certain qualities which cause teachers to grade them more favorably and vice versa for the boys. Personal characteristics and attitudes, such as shyness, docility, undue aggressiveness, and the like, seem to enter.

It is well-known that attractive personalities, good conduct, and a manifest desire will earn higher grades, when equally efficient students, lacking these attributes, receive low marks. Pleasing and desirable traits are not legitimate items to consider when marking for a given ability, understanding, attitude, or skill. We should not grade ambition in place of ability, effort in place of efficiency, nor sincerity in place of success.

Are we then to give no credit for effort? Is there to be no reward for persistence, coöperation, attention, nor for other highly desirable traits and attitudes? Certainly. But *not* in the history, literature, or mathematics grade. Effort is not the same thing as ability to do quadratics, and the mark for skill in solving quadratics has already accounted for such effort as was needful. The best illustration of the fallacy involved in giving grades for effort is to consider the case of arithmetic. The pupil can only progress if he has really acquired the understandings and skills involved. To give a passing grade in arithmetic because the pupil "tried so hard," "was so earnest," or "determined to succeed" is merely putting the pupil in an impossible situation, interfering with the administration of the school, and what is much more important, confusing if not preventing the ordinary process of learning.

[3] S. A. Courtis, *Why Children Succeed* (University of Michigan, 1926).

The new type of report card cares for this situation admirably. Many progressive schools make definite provision for grading the pupil in several of these highly desirable personal and social attributes. The items are listed as are the traditional subjects, and marks assigned. Touton and Struthers [4] propose for several of these items a description of the varying degrees to be discerned and marked. Too long to quote here, the exhibits on the next page indicate the nature of the scheme.

Similarly spelling, punctuation, grammar, etc., should not be considered in grading other subjects, unless the English usage is actually so poor as to obscure what the pupil is trying to say. Then, of course, we cannot derive evidence as to his learning. Progressive schools are providing for a separate grade in English usage, and all teachers should contribute to the making up of this grade for a given student. That is, bad spelling and punctuation should not lower a student's chemistry grade. Schools should require proficiency in English usage as in anything else, should refer bad cases to the English department for remedial teaching and may even, if they wish, refuse graduation to a student who has a fair mastery of subject matter, but whose English is so bad that he will never be able to realize on his learning.

Attempts have been made on some report cards to indicate progress where differentiated curricula are in use, to indicate the number and kind of voluntary projects, etc., by addition of coefficients to the grade.

Gathering and compiling data. Obviously an actual grade depends upon adequate data concerning the achievements of the learner. A good portion of this evidence is gathered by the instructor in his daily contacts with the class. Guided by explicitly described evidences of learning,

[4] Touton and Struthers, *Junior High-School Procedure* (Ginn & Co., 1926), pp. 218, 219.

DEFINITION AND MARKS OF CITIZENSHIP TRAITS

	Grade 1	*Grade 2*	*Grade 3*	*Grade 4*	*Grade 5*
Initiative and work habits, or qualities that reveal the way a pupil works.	Exceeds assignments; is resourceful, shows ability, is methodical, and is able to focalize his energy.	Is faithful and cheerful in doing all work assigned; ambitious in some desirable achievements.	Attacks all new work without much help from teacher.	Uncertain, not much initiative manifest; lacks perseverance and good work habits.	Little or no effort to make up back work; poor habits of work.
Coöperation and group consciousness, conscious effort and ability to stimulate and contribute to group accomplishment.	Forwards all worthy group activities.	Effective in group work.	Has regard for teamwork.	Not positive nor very effective in any group accomplishment.	No apparent regard for team work.

such as are contained in the grading schemes illustrated on previous pages, a teacher can readily derive much reliable evidence from the daily class procedure. *Rapport* testing is a device here. The various papers or other productions of the pupil will also supply evidence. The results of standardized tests are legitimate evidence for some types of learning.

Some schools require reports weekly or at longer intervals on pupils who are markedly above or below average in skill, interest, self-dependence, or in any other personal attribute aiding or interfering with learning. These are for the personnel office or the principal in facilitating adjustment, but also serve a very useful purpose in necessitating the gathering and filing of specific data concerning the pupil.

Morrison [5] advocates a course report to be turned in by each teacher that will show certain things. The process of making up this course report is a material aid to the teacher in estimating pupil status. In brief, the course report should show the following things: first, a list of those pupils whom the instructor judges to have attained mastery of the desired learning outcomes; second, a list of the voluntary projects undertaken by various pupils, which the teacher believes to be reliable, symptomatic evidences; third, a list of those pupils who have not yet completed the learning outcomes desired. They may need coaching. The presumption is, however, that these students will complete the course without any undue irregularities. Fourth, a list of those pupils whose work is incomplete, but who are definitely handicapped in more or less serious ways in their learning. Some of these cases can be easily diagnosed and corrected, while others will need more detailed analysis and treatment. Such course reports could,

[5] H. C. Morrison, *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), pp. 599-607.

of course, contain any other desired items that would help in determining a student's actual standing.

The passing grade. If the real learning products could be sharply defined and readily recognized, and if teachers considered actual learning instead of other items, then theoretically there would not be a specific passing grade. Pupils could be shown (except for skills), either to have acquired or not to have acquired the desired learning responses. They would have learned some units and not others, learned the first four of seven units and failed in three. The traditionalist will react vigorously against any such implication. However, before rejecting the idea, it may be well to understand it. Admittedly it has a large number of "ifs" in it. Many practical difficulties stand in the way, but certainly the emphasis, which is the emphasis through this volume, upon defining, recognizing, and testing the true learning responses—unit learnings—should be of value in clarifying thought.

For most ordinary skills, the required level for efficient functioning in the world has been determined by analytic attack. This gives us the *standard scores* for various skill tests. These are the passing grades already adjusted for us through the successive school levels. The pupil's score really need not be translated into a grade, unless demanded by the institution. Recording the score made, at the same time showing the norm, indicates the relation of the pupil to the desired level. This should be sufficient and, in most cases, satisfactory.

In other than skill learnings, the actual presence or absence of learning should be determined. But as suggested above this will probably be extremely difficult, particularly with present levels of teacher training.

But the administration demands a passing grade. Probably the best procedure possible is a compromise in which actual learning is as accurately determined as possible and

demanded for passing, grades above passing to be differentiated in terms of skills and special interests.

Where grades are based not on learning, but upon the repetition of text material, the working of exercises, etc., as they probably are in most cases, the determination of the passing grade is easy. It can be done arbitrarily, or on the basis of some given percentage of performance activities. In fact, it is usually determined locally by public opinion. In some regions it is 60, in others 75, depending on the demands of the local board, the parents, the superintendent, or some nearby university. If determined by the school, it should be on the basis of point scores made. The average score is translated into the average grade, and other grades determined by the distribution of scores. Still another method is to determine the number of failures (indirectly the passing grade) by the normal distribution curve or some phase of it. This will be discussed in later pages.

The distribution of grades. If we could measure exact learning, the problem of distribution would evaporate. If a compromise system is adopted wherein real learning is determined as accurately as possible, and grades or marks based on other items—interest, initiative, and skill—distribution takes care of itself to the degree that the descriptions of the various grades are explicit and evidences readily recognizable. The teacher can identify with reasonable accuracy the group into which a student falls.

However, school marks for a long time to come will be based on performance of subsidiary activities instead of upon the functioning of real learning. Measured thus, students will distribute themselves in various groups with gradations between groups.

The device most often suggested as a means of determining what percentage of pupils should have an A, a B, or a C, or Superior or Good, is the normal distribution

curve. This curve is a representation of the facts derived when any large number of unselected items of any kind is measured. There will be a few cases at each end, the largest number of cases grouped near the middle, and a gradual and regular decrease in number from the middle toward both extremes. An illustration may make the foregoing brief abstract statement clearer. For instance, if we were to measure the height of five thousand men, picked up at random, we would find a few unusually tall men, a few unusually short men, a very large number of men of about the same height, which height would be almost exactly half-way between the tallest to the shortest. For each height from the commonest down to the shortest, and up toward the highest, there would be fewer and fewer cases. We need not be concerned with detailed statistics here; the general idea can be applied to the grading system. On the basis of this curve, advice is often given to teachers to make some such distribution of grades in their classes as the following:

	A	B	C	D	F
	7	24	38	24	7
or	3	22	50	22	3
or	10	20	40	20	10

As a matter of fact, this is largely a snare and a delusion, and has been used most unfairly in many instances. The normal curve is based on the assumption that the group is unselected. The curve fits perfectly only in such instances. No group of pupils beyond the primary school is unselected. Even there, many at the lower end of the distribution have already been eliminated. A curve based on the grades actually earned by large numbers of students over periods of time and in many courses, will always be skewed toward the upper end of the distribution, unless

the group is definitely retarded, in which case the skew will be the other way. Herein lies the cue to the proper use of curves in operating a grading system. Schools should develop from data in their own office a local probability curve, which will thus be based upon their own procedure over a period of years. A large body of data is not affected by the idiosyncrasies of individual instructors who may grade with unusual severity or unusual leniency. These cases cancel each other, and inferences drawn from the entire body of data are reliable guidance for local procedure. For example, in each quarter, instructors at the University of Chicago receive from the recorder's office mimeographed sheets containing: (1) a statement of all grades in all departments for the past quarter; (2) a statement of the per cent of A, B, C, D, and F grades given by all departments over a period of 1, 2, or 3 years; (3) a statement of the grades given by the individual instructor receiving the sheet, in comparison with individual instructors in his own department. This enables each teacher to compare his grades with those of his own colleagues, and with the practice of the University as a whole for the current period. Thus the percentage distribution at Chicago has been found to run in round numbers about as follows:

A	B	C	D	F	*No. Grade*	*Provisional Grade*
13	35	36	8	3	1	4

Such distribution, however, should not be used to *determine* grades, but to *aid* the instructor in grading fairly. It is not only unjust, but distinctly illogical, to follow the openly announced policy of some instructors, namely, of distributing grades in all courses and sections largely in terms of the distribution curve. It is unfair, if not stupid,

to give but two A grades, if that is what the curve calls for, when six students deserve an A. It is even worse to assign an arbitrary number of failing grades because the curve calls for them, when no student really failed the course. Other things being equal, the distribution of an instructor's grades for all courses for a year, certainly for more than a year, should approximate the distribution for the given school. The distribution for a given class may vary widely from the scale. The value of such distributions as a check is to be seen most clearly in dealing with the unduly severe or unduly lenient grader. Certain instructors pride themselves on "flunking" large percentages, believing that this indicates "high standards." They object to distribution by the curve because they say it "lowers standards." The fact is that it would be difficult to lower standards further than they have already done by arbitrary "flunking." Usually, in ordinary schools, high percentages of failures indicate but one thing, very poor teaching. On the other hand, some instructors are satisfied with "attitude," "point of view," general interest in the course," instead of more clearly defined results. This group tends to give far too many high grades. Other reasons may, of course, enter into given cases of high or low grading. Any instructors, however, who vary seriously from the statistically determined normal distribution for their institution, are under obligation to explain the situation. Teachers who object to such use of distribution curves are revolting against irrefutable fact. They either do not understand the principles involved, or are unwilling to give up long cherished but baseless practices.

Translating scores into grades. There is some discussion in various texts regarding the technique of translating scores on achievement tests into grades. Simple statistical procedures are recommended. There is, however, an easier, and it is to be hoped a more correct, method of handling

this matter—do not translate scores into grades. Why should they be translated?—usually only for routine, administrative purposes. The score will serve all other purposes as well as a grade. These tests essentially measure memory or skill in which there are obvious degrees of learning. Standard scores for age and grade are available. The pupil's score indicates his status in relation to a known and accepted norm. Both the norm and the individual score should appear in the report. There is little to be gained by translating into grades. Objections are sometimes raised to the validity of the norms, but this is not our problem here.

If scores must be translated into grades, a simple procedure is best, and it is only reliable when both the group and the number of test items are large, and when both are legitimate samples. The average performance (score) should be translated into the average grade in the local system. It is then relatively simple to group the scores above and below this point, and relate them to the grades.

Relative grading. Some students and instructors may wonder at the omission from these pages of any mention of relative grading. The majority of text discussions advise grading pupils in relation to each other. That is, we determine which one answers the most questions, does the most exercises, makes the fewest errors, then the next one, the next one, and so on through the group. We decide which paper is the most adequate, coherent, and well written, the one which is the next best, and the next best, and so on. It is suggested that papers be read and grouped in terms of their relative excellence, those in the first pile to receive A, or if they are not very good a B, and so on with the rest of the piles. The present discussion definitely breaks with this tradition, believing (1) that such grades are likely to be based on number of questions answered, type of English used, amount of detail, etc., rather than

on evidence of actual learning; and (2) that pupils should be graded not in relation to each other, but in terms of their relation to acquisition of the desired learning products. That is, evidences should constantly be gathered showing explicitly, not whether one pupil is better than another, but whether the given pupil has learned or not. What other pupils have done has nothing to do with the status of any given pupil.

However, for those students who do not agree, the technique of relative grading is clearly indicated above and is relatively easy to carry out. In the case of skills and memory, there is doubtless some justification for relative grading.

Similarly, we are not concerned with the weight to assign final examinations, quizzes, papers, daily recitations, etc. Each of these contributes evidence, sometimes similar and sometimes different, toward an accurate composite picture of the learner to be brought up in the teacher's mind. Those instructors who wish to assign weights to the various items may use any scheme they wish, as one is as good as another.

Summary. In general, a pupil's grade should be based on reliable evidence of genuine acquisition of the desired learning responses. Evidence is to be derived from the daily activities of the pupil in studying, reciting, presenting, carrying on individual projects, and from various tests and examinations. The nature of the evidence on which grades are based must be clearly in mind, preferably embodied in explicit statement, as illustrated in foregoing pages. There should be on file a constant cumulative record concerning each pupil, into which goes all possible desirable evidences concerning his progress.

To the degree in which the above procedure can be carried out, there will disappear many traditional problems regarding weighting, distributing, passing, etc. It is ad-

mitted, however, that the discussion is in part ideal, and probably the best procedure at present is a compromise between the desirable and the necessary.

Even though some of the suggestions above are radical and theoretical, there is a growing tendency toward them, as is indicated by similar summaries appearing in recent books. The following is adapted from a discussion by Rugg.[6] He recommends the following statements for the improvement of grading:

The publication of the distribution of teachers' marks each semester in open bulletins.

The discussion of these bulletins in teachers' meetings.

Insistence that each teacher tabulate and plot graphs of her distribution of marks each semester before submitting them to the office.

Requiring reading and discussion of the use of distribution curves in marking.

Insistence that each teacher rank her pupils prior to assigning final marks, whether on examination, "paper," "quiz," or semester's work.

The appointment of departmental committees with instruction to define, *in detailed word-statements,* each grade of ability represented on the marking scale.

The use of objective scales and tests in all those subjects and for all those types of subject matter for which such tests and scales are now available.

The use of "general-ability" tests for purposes of classifying pupils, and of detecting various grades of ability in our pupils early in the course of instruction.

If letters are now used in school system, certainly each one should be merely a symbol to signify the abilities-to-do which have been defined in very detailed worded statements, understood alike by teacher, administrator, and pupil, in terms of which the instruction has constantly been oriented.

If numbers are used they should be employed only as economical symbols to represent the various groups or divisions of the marking scale; that is, only one number (for example, the

[6] H. O. Rugg, *A Primer of Graphics and Statistics for Teachers* (Houghton Mifflin Co., 1925), Ch. vi.

median one) should be used to typify a group of marks (as, for example, the "excellent" group, the "A" group), instead of using, as is now common, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. Thus the only numbers used would be such clearly separated numbers as 95, 90, 85, etc. Numbers in themselves would cease to have the "picayunish" absolute differences in meaning that they pretend to now, and would merely stand for abilities which have been distinguished clearly through detailed worded statements.

As a practical and helpful tool in the adequate measurement of student work, measurement by ranking with subsequent transmutation to absolute marks by means of a distribution cruve (preferably the normal probability curve) is very desirable.

Discussion Questions for Summarizing and Testing on Problem 4

It is obviously difficult to give adequate tests of the understandings and abilities to be derived from the foregoing discussion. Merely to give student papers to grade will probably give practice in grading performance and not learning. The following suggestions may, however, be of assistance.

1. Construct a tentative marking scheme for a given type of outcome or method of teaching. That is, attempt to construct explicit descriptive schemes of value in directing teacher judgment in marking.

2. Let students (toward the end of the course) attempt to mark themselves in terms of a scheme organized and given out by the instructor.

Parallel Readings for Problem 4

1. Douglass, H. R., *Modern Methods in High-School Teaching* (Houghton Mifflin Co., 1926), Ch. xii.
2. Johnson, F. W., *The Administration and Supervision of the High School* (Ginn & Co., 1925), Ch. xv.
3. Monroe, W. S., *Directing Learning in the High School* (Doubleday, Page & Co., 1927), Chs. xv, xvi.
4. Monroe, DeVoss, and Kelly, *Educational Tests and Measurements* (Houghton Mifflin Co., revised, 1924), Chs. i, xii.
5. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Chs. iii, iv, v, xxx.
6. Odell, C. W., *Traditional Examinations and New-Type Tests* (Century Co., 1928), Chs. v, vi.
7. Ruch, G. M., and Terman, L. M., *Manual of Directions for the Stanford Achievement Test* (World Book Co., 1927).

8. Rugg, Harold, *A Primer of Graphics and Statistics for Teachers* (Houghton Mifflin Co., 1925), Ch. vi.
9. Touton, F. C., and Struthers, A. B., *Junior High-School Procedure* (Ginn & Co., 1926), Ch. vii.

PROBLEM 5

HOW MAY DIAGNOSTIC PROCEDURES BE USED IN IMPROVING TEACHING?

Exploratory and Pre-Test Questions

None. Proceed to study of the text.

In a recent magazine article [1] a parent, interested in his son's failure in arithmetic, states that he collected the boy's papers over a period of time, analyzed them, and discovered that failure was due in all cases to but one item, inability to multiply correctly. The boy knew what processes were demanded by his problems, that is, he could think mathematically, and except for multiplication could perform the computational operations with more than average accuracy. What the teacher had marked as failure in arithmetic, was really only failure in one of several phases of arithmetic. Obviously, remedial drill in multiplication would have cured the situation, had the teacher known what the trouble was. In this case the parent discovered the difficulty and put the boy through the necessary additional drill, with the result that the failure in arithmetic was removed. This parent, through his own ingenuity of thought, had hit upon a procedure which should be in the possession of every teacher, namely, diagnosis and remedial teaching based upon the diagnosis.

Similarly, a boy was sent from a public school to a near-by college of education, for examination. His teacher reported him average or better in everything except arithmetic, in which he had been a problem for several years

[1] "The Education of an American Boy," anonymous, *Harper's Magazine* (December, 1928).

and was now failing completely. The examiner accidentally overlooked the school report, and after testing the boy astonished every one by stating that he found excellent ability in mathematical thinking, and good ability in arithmetical computation except for a few of the basic number combinations. "But," said the teacher, "the boy cannot do arithmetic. Look at this one paper which has thirty mistakes in it." The examiner took the paper and soon said, "Instead of making thirty mistakes, he has made but five, but he made each of the five about six times apiece!" The boy had never acquired absolutely automatic response for a half-dozen simple number combinations. Since the simple processes of addition, subtraction, etc., occur over and over again in a set of problems, inability with three or four of them will very often result in inaccuracy in final answers.

Many of the supposedly simple processes in arithmetic, reading, and handwriting are in reality complex. In arithmetic, for example, it has been shown that adding a column of two or three figures is not at all the same process as adding a column of eight or ten figures. Courtis [2] lists seven processes involved in addition, three in subtraction, six in multiplication, and nine in division, all of them requiring a specific habit or automatism. Some of the Courtis tests automatically diagnose the difficulty for a given pupil. Brueckner [3] found 114 different kinds of errors which may be involved in working with decimals.

The differentiation between oral and silent reading has been made only in comparatively recent times. Most lay analysts, and at first many teachers, did not admit that there was much difference, but there are, in fact, several different processes involved in silent reading alone.

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[2] S. A. Courtis, *Teachers Manual for Arithmetic Tests* (World Book Co., 1919).

[3] L. J. Brueckner, "Analysis of Difficulties in Decimals," *Elementary School Journal,* Vol. 29, September, 1928, pp. 32-41.

Freeman's [4] work in analyzing handwriting into a number of processes, each valuable in diagnosing an aspect of poor writing, is a monumental piece of work, showing very clearly how the composite thing, a written word, involves several factors and abilities on the part of the pupil. Many other illustrations are made available in the following pages.

Types of diagnostic procedure. An excellent summary of general methods of diagnosis is to be found in the first paragraph of Brueckner's article on decimals:

> In general, there are three types of diagnostic procedures that are being used to determine the abilities of pupils in arithmetic. The first of these may be called the *survey* procedure. The teacher who follows this procedure is concerned with such factors as the arithmetic age of the pupil, his relative ability as measured by a general test in arithmetic, and his placement in a grade. The second diagnostic procedure may be called the *analytical* method. Here the teacher is concerned with the more specific problem of determining the types of examples with which the pupil has difficulty. This may be accomplished by giving the pupil a diagnostic test containing the various types of examples in such a process as the addition of decimals for the purpose of determining the specific types of examples with which the pupil has difficulty. The third diagnostic procedure may be called the *psychological* method. This procedure is concerned with the question of *why* a pupil fails to work any given example correctly. In using this method, the teacher attempts to discover the particular element in the process that is causing the difficulty or whether the errors are due to faulty methods of work. The teacher uses either of two methods in diagnosing the pupil difficulties: (1) an analysis of the pupil's written work, by which it is possible in many cases to discover the reasons for the errors; (2) an individual examination of the pupil in which the pupil is asked to work aloud the examples with which he has difficulty. The first may be used by the teacher to discover obvious causes

[4] F. N. Freeman, *The Handwriting Movement*, Supplementary Educational Monographs, Vol. II, No. 3. Department of Education, University of Chicago, August, 1918.

of error in the work of classes or individuals. The second should be used when pupils are found whose papers reveal peculiar methods of work and unusual types of error.

Diagnosis by general survey. A general survey test will reveal the gross difficulties, if any, of the class. This must be followed, of course, by analytical or psychological diagnoses of individual cases. An excellent summary of type results, which might be derived from a general survey test in arithmetic, is presented by Monroe.[5] A given class may fall into any one of the following groups:

Case 1. Class medians below standard in both rate and accuracy.
Case 2. Class medians for rate below standard with satisfactory or high accuracy medians.
Case 3. Class medians for accuracy below standard with satisfactory or high rate medians.
Case 4. Scores of members of class widely scattered.
Case 5. Irregular development; class medians in one test up to or above standard, with class medians in another test distinctly below standard.
Case 6. Class medians for both rate and accuracy up to or above standard, with the individual scores grouped closely about the medians.

Any particular class may exhibit certain combinations of these conditions. For example, the median rate in a test (such as addition) may be below standard with a satisfactory or high accuracy median, and at the same time the scores of the members of the class may be widely scattered.

For each of these cases, it is possible to list certain probable needs. All of these needs may not apply to a given class, but some of them will almost certainly be appropriate. In general, it will be profitable to investigate these needs first and determine which of them apply to the class in

[5] W. S. Monroe, J. C. DeVoss, and F. J. Kelly, *Educational Tests and Measurements* (Houghton Mifflin Co., revised, 1924), p. 76 *ff.*

question. The most probable needs for each case are given below.

This is a very much abbreviated summary of Monroe's detailed discussion of probable needs:

Case 1. Probably inefficient teaching, though some other causes might enter into extraordinary cases. Specifically, the difficulty probably is that drill periods are not utilized to best advantage.

Case 2. Lack of speed drills is the probable cause. Or, the speed drills have not been properly motivated. The devices used may have focused attention elsewhere than on the process needing drill.

Case 3. May be due to improper conditions at time of test. Pupils often have to be trained to work at fair speed under pressure of a time limit. One of the several processes involved in addition may be weak.

Case. 4. Here there is need for more individual testing than in any of the others. There should be an inquiry into the past history of the pupils.

Case 5. Irregular development is made possible because there are a number of types of examples. Emphasis in teaching can be shifted to meet the trouble. The *Courtis Standard Research Tests, Series B,* can only show irregularities between the four fundamental operations. A series of diagnostic tests will reveal irregularities between different types within the same operation.

Case 6. When medians and distributions are satisfactory, there are still needs to be met. Promotion for some pupils to a higher grade may be indicated. Less time to this subject and more to others, or opportunity to take a new subject might be involved.

Locating a class under one of these possible cases is the first step in interpretation, and it is necessarily somewhat crude. The next step is to utilize more specific analytic or psychologic diagnostic procedures. This will be illustrated later.

After a test has been administered, the results should be

tabulated, and from these data a surface of frequency or line graph should be constructed. These devices show the teacher very clearly and objectively the situation in the class. The distribution of scores showing not only the number of advanced, retarded, and normal-progress pupils, but also the relation of the class to any standard distribution which may be available.[6]

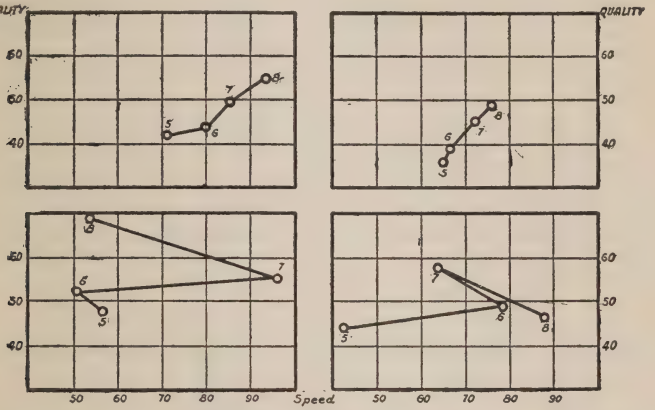

FIG. 6. AVERAGE QUALITY AND AVERAGE SPEED OF HANDWRITING OF PUPILS OF THE FOUR UPPER GRADES IN FOUR SCHOOLS.

Another exhibit presents evidence concerning not only a grade, but making possible direct comparison between grades within a school, and schools within a system. The above diagrams show the facts regarding speed and quality scores in handwriting for four elementary schools.[7]

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[6] Classes which have not had experience in constructing simple graphs and surfaces of frequency showing the class situation, may be given training at this point. An excellent discussion of simple procedure is to be found in Parker, *General Methods of Teaching in Elementary Schools,* pp. 298-302.

[7] "Measuring the Work of the Public Schools," *Cleveland Education Survey,* Survey Commission of the Cleveland Foundation, Cleveland, Ohio (1916), pp. 75-77.

The diagrams are easily read. In the school represented by the upper left diagram, the fifth grade has an average speed of 71 letters per minute, and an average quality of 41. The sixth, seventh, and eighth grades show progress in both speed and quality, the sixth grade making more progress with speed than with quality. In the school represented by the diagram on the upper right, there is also

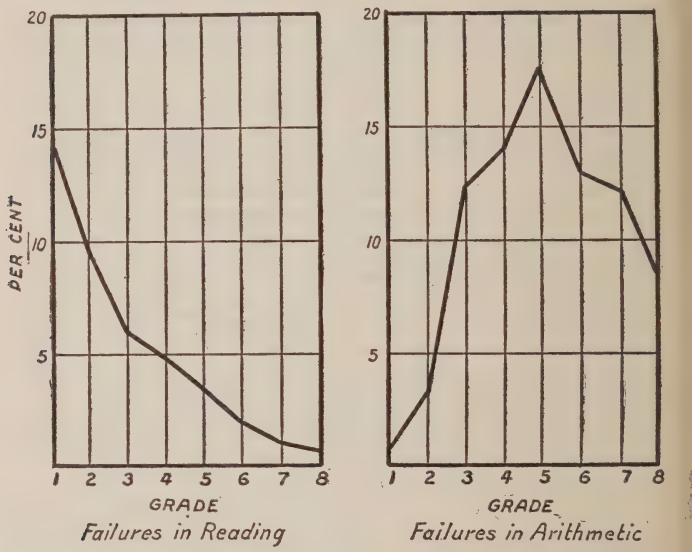

FIG. 7. RECORD OF FAILURES BY GRADES IN CLEVELAND, 1914.

progress from grade to grade in both qualities, though the sixth grade makes little progress in speed.

As a class exercise, students may interpret the two lower diagrams, (1) telling the facts portrayed, and (2) advancing tentative diagnoses.

A similar general survey technique goes beyond the realm of the individual teacher, and directs attention to another possible source of pupil difficulty, namely, an improperly

arranged course of study. The diagrams [8] on page 544 show the per cent of failures in reading and arithmetic in the elementary schools of Cleveland for 1914.

The results in reading indicate that the pupils are normal, and the results are in accord with normal expectancy. Not so with arithmetic. Since the same pupils and teachers are involved and the results include all schools, the inference is justified that the learning difficulties are due to gradation of material in the arithmetic course. It is not properly adjusted to the power and maturity of the learner. The remedy lies in the reorganization of the course and the production of better textbooks.

The same general situation is illustrated on the high-school level by the chart on page 546 [9] based on the failures in four subjects for all four classes in the University of Chicago High School.

Evidently the situation in the languages is normal both as to adjustment between pupil and subject matter, and as to teacher purpose. The mathematics situation and erratic results in English admit of several interpretations, which the class may attempt to make at this point. Correct interpretations will, of course, rest upon certain data not in the possession of the students, but tentative diagnoses can be advanced.

Diagnosis by analytic tests. While there are many tests available for general survey purposes, relatively few have been developed for the more detailed analytic processes of individual diagnosis. Much progress is being made, however. Space prohibits detailed illustration. The teacher should consult such reliable and comprehensive discussions of diagnostic and remedial teaching as are to be found in such books as Monroe, DeVoss, and Kelly, *Educational*

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[8] *Ibid.*

[9] F. W. Johnson, *Administration and Supervision of the High School* (Ginn & Co., 1925), p. 292.

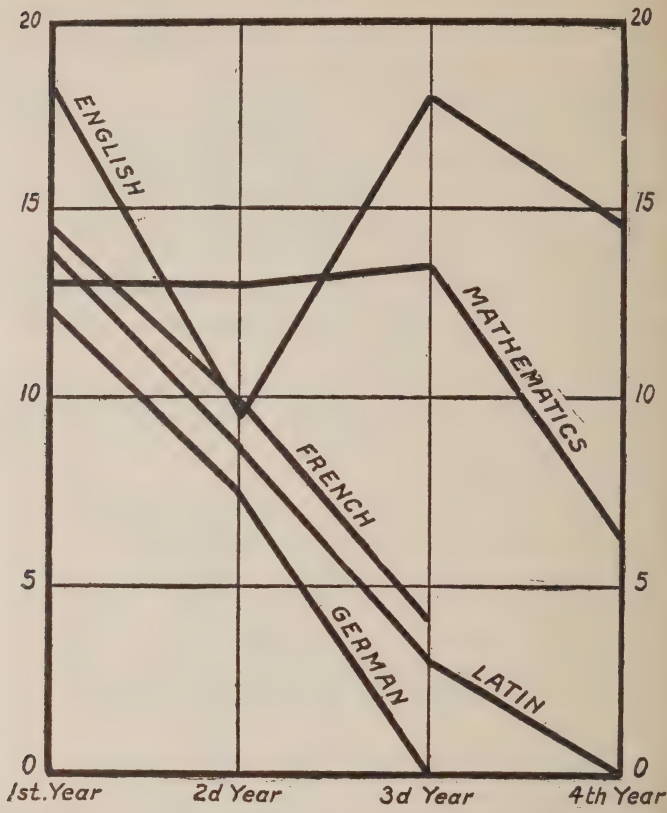

FIG. 8. PERCENTAGE OF FAILURES BY YEARS IN MATHEMATICS, ENGLISH, LATIN, GERMAN, AND FRENCH IN THE UNIVERSITY OF CHICAGO HIGH SCHOOL.

Tests and Measurements, and McCall, *How to Measure in Education.*

An illustration of the procedure is to be found in Brueckner's investigation of difficulties with decimals, referred to earlier. A number of tests were constructed covering the various phases of manipulating decimals, including read-

ing, writing, and conversion. The computations were kept as simple as possible, so that the possibility of error because of difficulty in computation was clearly subordinate to the possibility of error in handling decimals. The following twelve examples are typical of the list of thirty designed to test the pupils' abilities in dividing, and to discover possible sources of error:

1. $4\overline{)8.4}$	2. $3\overline{)7.47}$	3. $8\overline{)16.896}$
4. $2\overline{).8}$	5. $4\overline{).76}$	6. $6\overline{).972}$
7. $4\overline{).12}$	8. $6\overline{).042}$	9. $24\overline{)1.2}$
10. $8\overline{)4}$	11. $8\overline{)6}$	12. $25\overline{)2}$

After a group of tests has been given, the errors must be carefully tabulated and grouped in order to determine typical errors, and to discover which errors are handicapping given pupils. Usually large numbers of errors are discovered which may be grouped in typical classes. Certain typical errors may be more prominent with one grade than another. In Brueckner's [10] study a large number of specific errors was found, but three types stood out as most prominent, (1) inadequate conception of numerical values of decimals, (2) misplacement of decimal point in division, and (3) misplacement of decimal point in multiplication. These errors may be made in a number of different ways.

Specific difficulties in oral reading may be similarly analyzed by means of Gray's Oral Reading Test. Given to individual children the test is somewhat expensive of time and effort, but is one of the most accurate diagnostic instruments available. Practice is necessary before it can be used successfully. The test [11] consists of a series of

[10] Brueckner, *loc. cit.*

[11] For this and other test references in the following pages, refer to Monroe, DeVoss, and Kelly, *Educational Tests and Measurements* (Houghton Mifflin Co., revised, 1924).

paragraphs of increasing difficulty which are read by the pupil as the examiner follows on another copy and marks with special signs the following errors:

1. Complete mispronunciation of a word so as to indicate that the pupil has no control over it
2. Partial mispronunciation
3. Omissions
4. Substitutions
5. Insertions
6. Repetitions

The method of marking these errors on the test paper is illustrated in the following quotation from the class record sheet:

The sun pierced into my large windows. It was the opening of October, and the sky was of a dāzzling blue. I looked out of my window and down the street. The white houses of the long straight street were almost painful to the eyes. The clear atmosphere allowed full play to the sun's brightness.

If a word is wholly mispronounced underline it as in the case of "atmosphere." If a portion of a word is mispronounced, mark appropriately as indicated above: "pierced" pronounced in two syllables, sounding long *a* in "dazzling," omitting the *s* in "houses," or the *al* in "almost," or the *r* in "straight." Omitted words are marked, as in the case of "of" and "and"; substitutions, as in the case of "many" for "my"; insertions as in the case of "clear," and repetition, as in the case of "to the sun's." Two or more words should be repeated to count as a repetition.

The *Briggs English Form Test* presents the pupil with a series of sentences which are correct, except for one or more of the following seven items:

1. The initial capital
2. The terminal period
3. The terminal interrogation point
4. The capital for a proper noun or adjective
5. The detection and correction of a run-on sentence
6. The apostrophe of possession
7. The comma before but coördinating the members of a compound sentence

The pupil is directed to read the sentences to get their meaning and then to put in the proper corrections in each case.

The *Wilson Language Error Test* comes in several forms of equal difficulty. These are short stories, one to a test, each containing twenty-eight typical language errors. These may be in verb form, use of pronouns, choice of words, etc., which the pupil is asked to detect and correct.

Although copying is a common activity both in school and in real life activities, it has received little attention. It would seem that any one of ordinary intelligence could copy accurately any ordinary selection set before him. However, an astounding number of errors is made. One pupil misspelled "lieutenant" five times and in four different ways, with the correct spelling in front of him all the time! Common errors involve the omission or misplacement of punctuation marks, which obviously might be a serious matter in copying legal documents. The errors which are made and which must be eradicated include:

1. Misspelling
2. Capitalization
3. Omitted words
4. Added words
5. Wrong words used
6. Misplaced words
7. Punctuation
8. Undotted "i's"
9. Uncrossed "t's"

By means of this type of analytic diagnosis, used alone or in combination with the psychological method, innumerable specific difficulties can be detected and corrected through redirection of teaching and study. The following are but a few to be found in arithmetic: nonautomatic command of certain number combinations, misplaced decimal points, irregular columns in addition, wrong reading or copying of the problems, incorrect manipulation of factions.

In reading, the tests may reveal a vocabulary lack, or there may be too much emphasis on oral reading, and not enough on silent reading. In silent reading, pupils may differ in speed and comprehension in any of several ways. Spelling has a large number of possible errors, some due to mispronunciation, others to careless pronunciation and writing. Phonic irregularities in the language account for others. Handwriting tests will reveal whether the trouble is with speed, slant, letter formation, or spacing. The position of the pupil at the desk, the type of finger or arm movement, will also be found as factors involved in learning.

Diagnosis by analysis of pupil's actual procedure. In addition to analyzing the pupil's performance on standardized tests, the teacher may sit down with other written papers of the pupil, or with the pupil himself, and minutely analyze what happens as the work proceeds. The teacher either analyzes and tabulates errors appearing in the paper, or listens while the pupil works aloud, reads aloud, or describes his thought process as he works. The analysis of written papers is obviously similar to the analysis of diagnostic tests just described, and needs no further discussion here.

When the pupil works aloud, many interesting things may come to light. Instead of saying, "9 and 8 equal 17," he may say, "9 and 2 are 11, and 2 are 13, and 2 are 15, and 2 are 17," checking the 2's against the 8 as he proceeds. Many pupils have difficulty with certain combinations, and use odd ways of getting the answer. Many say, "7 and 4 are 11, and 1 are 12," instead of the automatic response, "7 and 5 are twelve." Others count on their fingers or use other devices. A more elaborate illustration of this procedure is to be seen in the exhibit [12] from Smith's study of pupil difficulty in arithmetic. He had a pupil work aloud

[12] J. H. Smith, "Individual Variations in Arithmetic," *Elementary School Journal*, Vol. 18, November, 1916, pp. 195-200.

as he proceeded through relatively complex computations, noting the errors as they were made, and later relating them directly to the pupil's paper:

Subtract:

9	7	11	8	12	1	9	13	4	12
9	3	6	1	3	0	7	8	3	6
0	(5)	(4)	7	9	1	(3)	5	1	6

Time: 32 sec.

Subtract:

1335	816	1157	854	Said 8 from 15
419	335	908	286	"forrowing"
(927)	481	249	578	

Time: 57 sec.

Divide:

```
  571
69)40296
  335      mult. error
  579
  483
  ---      subt. errors
   85
   69
   --
   17
```

Time: 2 min. 37 sec.

Failed to notice the remainder 85 was larger than the divisor. Failed to notice neglect of carrying down the 6.

It should be noted here that psychological diagnosis, when carried far enough to inquire into the *causes* of difficulty, may be supplemented by utilizing the results of in-

telligence tests. A pupil's I.Q. and M.A. are important items in diagnosis. Learning difficulties are to be expected with the lower I.Q. levels, but similar difficulties with upper level pupils call for analysis and explanation.

Waples [13] suggests another valuable diagnostic device

	English	Civics	General Science
	A	*D*	*B*
Pupil No. 1 Boy	Father a busy librarian. Encouraged to read much and accustomed to hear correct English spoken.	Family discusses literary curiosities rather than current events. No interest.	Reads *Popular Mechanics* and has considerable knowledge about science, but no direct contacts.
	B	*B*	*E*
Pupil No. 3 Girl	Father a lawyer. Mother used to teach. Girl has read much but very superficially. "Flighty" in her class work.	Hears current events intelligently discussed at home and reads the papers regularly.	Has never helped with the housework; takes all scientific data for granted. Is bored with class work.
	D	*D*	*A*
Pupil No. 4 Girl	Father is manager of chemical plant, reads nothing but scientific journals, and is very careless in speech.	Family has moved too often to have ever taken interest in community activities. Music takes time of mother.	Girl reads all she can of scientific literature, and does most of the housework. Plans to enter medicine.

useful in supplementing those already mentioned. Inquiry into the pupil's home and general social environment, previous contacts with the subject, will often reveal facts of great importance in explaining difficulties and in indicating the probable remedial attack. The above illus-

[13] Douglas Waples, *Procedures in High-School Teaching* (Macmillan Co., 1924), pp. 42-43.

trates the type of data available. *Pupil No.* 1 received grades varying from A to D. *Pupil No.* 3 from B to E, and *No.* 4 from A to D. Inquiry into home contacts aid in explaining the situation.

Some of the data in the preceding exhibit indicate that interest in a subject or lack of it (apart from other factors), is roughly correlated with success in the subject or lack of it. In addition to difficulties inherent in the subject matter or the learning process, the results in learning will also be conditioned by certain personal characteristics or traits. Among these will be interest, effort, sullenness, optimism, carelessness, initiative, recognition of responsibility, and many others. Touton and Struthers [14] suggest that the examiner attempt to record his impressions of pupil traits on some such chart as that illustrated below. Evidence regarding these traits is doubtless derived most effectively through interviews, or through the daily contacts in the classroom.

REACTIONS DURING EXAMINATION

(*Check with plus or double plus*)

+Coöperative	Poor effort	Relevant
+Friendly	Restive	Trustful
Garrulous	Needs urging	Alert
Curious	Underactive	Grasps readily
+Good effort	Restless	Sullen
Suggestible	+Slow response	Easily discouraged
+Shows initiative	Inattentive	Hesitant
Overactive	Variable responses	Anxious
+Quiet	Cheerful	Self-distrustful
Rapid response	+Persistent	Easily embarrassed
+Attentive	Care-free	Impulsive
Regular responses	Direct	Careless
Uncoöperative	Self-confident	Aberrational
Shy	Self-possessed	Suspicious
Reticent	Deliberate	Sluggish
Lacking curiosity	Careful	Grasps slowly

[14] Touton and Struthers, *Junior High-School Procedure* (Ginn & Co., 1926), p. 79.

TYPE OF MIND

1. Memory group
2. Accelerated physically and mentally
3. One-sided development: motor type; sensory type; artistic; mathematical; scientific; linguistic
4. Various combinations of different types
5. Neuropathic and psychopathic tension
+6. Normal

NOTES OF EXMINATION

M. is a very likable, interesting girl. She works slowly but conscientiously. She is normal but not outstanding in any of her reactions.

Summary:

Record:

Such charts must be accompanied by standards or objective descriptions of trait actions, so that the examiner or teacher may recognize and utilize only adequate evidence.

In conclusion, we may make explicit a point which has doubtless been clear to most students anyway. The diagnostic and remedial procedures are supplementary to the ordinary processes of teaching. Ordinarily skillful teaching will secure learning results with most pupils. Odd cases, either classes or individuals, may then be subjected to diagnostic treatment. The pre-test as discussed by Morrison, and as illustrated in this book, is in part a diagnostic procedure of the general survey type. It is designed to determine general status and point of beginning. It pre-

cedes teaching, but other diagnostic procedures follow an initial attempt at teaching.

Discussion Questions for Summarizing and Testing on Problem 5

1. The instructor should have available a number of class charts such as have been illustrated in preceding pages, allowing the class to attempt diagnostic interpretations.

2. Similarly, sets of individual pupil papers should be available to the class for interpretation.

3. The instructor may demonstrate the *Gray Oral Reading Test,* or have a pupil from the practice school work some problems aloud for class observation.

4. What are some specific things you might find out by examining the marks of your pupils in various subjects in the light of the intelligence test records? Make up hypothetical cases.

5. What tentative explanations could you advance in the case of a pupil of high I. Q. and low grades in all subjects? In one or two given subjects? In an actual situation how would you proceed to find out which of your guesses was right? Make up hypothetical cases.

6. Can you describe actual cases from your own observation in which, as far as you could see, the home environment materially aided or seriously handicapped a pupil in learning? A given personal trait?

7. Have you ever failed a subject and later passed it with reasonable ease? If so, were you aware at the time of the factors which caused failure or success? Describe as explicitly as possible.

8. It is commonly believed that an "only child" differs materially in some important characteristics from other children. Disregarding, for the moment, the validity of this belief, diagnose the ordinary situation and advance tentative explanations for the oddity of the only child.

9. It is sometimes said that the failure of a pupil is the failure of the school. Is this partially, wholly, or not at all true?

Parallel Readings on Problem 5

1. McCall, Wm. A., *How to Measure in Education* (Macmillan Co., 1922).
2. Monroe, DeVoss, and Kelly, *Educational Tests and Measurements* (Houghton Mifflin Co., 1917). Probably the best sum-

mary discussion. Many diagnostic tests specifically described. Sources of tests given.

3. Morrison, H. C., *The Practice of Teaching in the Secondary School* (University of Chicago Press, 1926), Ch. xxxi.
4. Paulu, E. M., *Diagnostic Testing and Remedial Teaching* (D. C. Heath & Co., 1924).
5. *School Surveys.* Practically all of the *School Surveys* contain excellent material upon the use of tests in evaluating instruction. Use the library card catalogue.
6. Spencer, P. L., "The Improvement of Teaching by Means of Home-Made, Nonstandardized, Diagnostic Tests and Remedial Instruction," *School Review,* Vol. 32, April, 1923, pp. 276-281. Very practical and usable. How to make and use diagnostic tests.
7. Touton, F. C., and Struthers, A. B., *Junior High-School Procedure* (Ginn & Co., 1926), Ch. iv. This contains a great deal of very specific and usable information.
8. Uhl, W. L., "The Use of the Results of Reading Tests as Bases for Planning Remedial Measures," *Elementary School Journal,* Vol. 17, December, 1916, pp. 266-275. Good concrete data.
9. ———, "The Use of Standardized Materials in Arithmetic for Diagnosing Pupils' Methods of Work," *Elementary School Journal,* Vol. 18, November, 1917, pp. 215-218.
10. Waples, Douglas, *Procedure in High-School Teaching* (Macmillan Co., 1924), Ch. iv. Contains many valuable suggestions and devices.
11. Zirbes, Laura, "Diagnostic Measurement as a Basis for Procedure," *Elementary School Journal,* Vol. 18, March, 1918, p. 505. Excellent practical analysis.
12. ———, "Attacking the Causes of Reading Difficulties," *Teachers College Record,* Vol. 26, June, 1925, pp. 856-866.

Note: The current periodical literature constantly presents discussions of diagnostic testing and remedial teaching. It is, therefore, impossible to present an up-to-date list of readings. Each instructor should select articles which appeal to him and add to the list. Students may be asked to find such articles, to report upon them, or to study those referred to by the instructor.

PROBLEM 6

HOW MAY TEACHING PROCEDURES BE MOST EFFECTIVELY PLANNED?

Exploratory and Pre-Test Questions

1. Experienced duck hunters say that it is of no avail to blaze away at a flight of ducks. You must pick out a duck and fire at it. Why? What has this to do with teaching?

2. In planning the accomplishment of any task in the world:

a. What is the first thing to do?
b. Could teaching proceed without attention to this point?
c. What is the general procedure after this first point has been determined?

3. What is the criticism implied when we say that a speech or a sermon was taken "out of the barrel"? Why is this true? Guidance for the teacher? Advantages, however, of keeping old plans on file?

4. What often happens if you try to tell a funny story that you used effectively a year ago, but which you have not told during the year? Make at least three points in answering this question. What guidance for the teacher?

5. An instructor teaches a very satisfactory lesson and is much pleased with procedure and results. He uses identically the same procedure the next semester. The lesson may or may not go so well; it may even fail. List several explanations. Guidance?

6. Have you ever failed in an argument, or in explaining something satisfactorily to some one, and later thought of just the illustration needed? What is the guidance for teaching?

7. List all the possible advantages of *not* planning:

a. A coming trip to Europe
b. Next year's work in college
c. A dinner to which ten guests have been invited

8. Which is the most complicated: planning a new evening gown; planning methods to increase sales in a small town variety store; planning to convince the citizens of a village to vote improvement bonds; planning to bring an understanding of the

causes of the American Revolution to thirty-five eighth-grade pupils? This question may be answered in general terms, or time may be taken to discuss it somewhat explicitly.

9. Might there be any connection between the distinctly mediocre teaching in many high-school and college classes, and the common lack of definite lesson planning on these levels?

10. Describe in some detail a case in which you are reasonably certain your teacher failed because planning was neglected.

a. Do the same for a case where the teacher succeeded because preliminary plans had been made.
b. Do the same for a case in which there seemed to be planning, but in which the lesson was still unsuccessful.

The teacher who does not make regular plans of some sort or other has either, (*a*) learned to organize mentally and to carry out such plans acceptably, or (*b*) she is a poor teacher. This challenging statement is deliberately placed to emphasize the necessity of planning. To be sure there are, as we shall see, dangers and disadvantages in the planning of lessons. Furthermore, teachers of various levels of experience and expertness are not expected to plan in the same detail, nor in the same form. Successful teaching on any level, however, involves, among other factors, preliminary planning. Let us examine briefly the reasons for and arguments against the planning of teaching procedure.

General arguments for planning. All other important human undertakings are planned. No one could build a road, a house, or a bridge without plans and specifications. If these seem to deal with mechanical and fixed items, consider the construction of a sales or political campaign. The most elaborate planning by high-priced "planners" is necessary to influence (teach) the public. Propaganda, advertising, publicity of any sort, are all methods of teaching, and are valuable only to the degree that they are planned carefully in terms of the results desired, the material available, and the psychology of the "learner."

One of the marks of intelligence and special ability is foresight and anticipatory planning. Careful planning for the future enables one individual, other things being equal, to accomplish things which his unorganized neighbor not only cannot achieve, but cannot understand. While luck figures, much more success in the world is due to planning for the future than to waiting for opportunity to knock. The stupid, the careless, the shiftless and lazy do not plan.

Teaching is a highly complicated process. Many different items must be manipulated during the class period, so that learning takes place. There is, first, a group of learners of various ages, chronological and mental, varied interests, backgrounds, and amounts of energy. There are, second, many and different outcomes which are to be accomplished singly, but more often simultaneously. Third, there is the subject matter and material of varying complexity and accessibility. The nationality, social and economic status of the school, and of the pupils comprising a class group; the type of building and room available will all complicate the matter. Furthermore, these items change from term to term, from week to week, and often from day to day. Improvised, inspirational, opportunistic teaching will inevitably bring muddle. confusion, chaos. Teaching must be planned.

Specific reasons for planning. The following advantages accruing from planning may be regarded as reasons for planning. Planning insures:

1. That the lesson has an objective
2. Reasonable adequacy of treatment
3. That the teacher knows the subject matter involved. [At least gross errors will be avoided.]
4. That the teacher has chosen a definite type of teaching
5. That the teacher has given attention to the proper learning process

   a. Type and content of proper pupil response
   b. Arousal of interest and necessary background
   c. Necessary adaptation to individual differences

6. So far as planning can insure it, coherence
   a. The ground will be covered
   b. The lesson will stay on the topic
   c. Digressions will be provided for
7. That provision for summaries, conclusions, connection with a series of lessons, has been made
8. That material and procedure will be ready when needed

It may be said that these things could be secured without a detailed, cumbersome system of planning. This is granted. In the first place, the system need not be cumbersome. The experienced and competent teacher can plan units and series of lessons on a very small piece of paper. A few pivotal questions will carry her through. But she acquired this ability by carrying on explicit, detailed planning as a beginner. In the second place, human nature is not so constructed that ordinary individuals will attend to all these necessary items in a given lesson without the training and pressure of planning. In the third place, even if the spirit moves them, few people are brilliant enough to carry through intricate, complex pieces of teaching without preliminary planning.

The beginner or the mediocre teacher must plan in some detail, gradually evolving an abbreviated "trick" system, adequate in the given case. Planning is not only essential to success, but, contrary to much teacher opinion, actually saves enormous amounts of time and energy.

Arguments against planning. Many and varied arguments have been advanced against planning, either as a training device or as a procedure for teachers in service. Some of the objections are trivial and silly, others are based on honest misunderstanding or false premises, while others are quite legitimate and must be answered.

Plans take too much time and work. Most objections to the labor of planning arise (*a*) from working under an unnecessarily detailed system imposed on the teacher by the administration, or (*b*) from laziness. The teacher's objections, quite justified in the first case, are not so in the second.

The mediocre teacher must always face the necessity of putting time and effort into planning, either on her own volition, or at the request of a principal or supervisor; or, if unwilling to do this, she should seek some other occupation.

The student in training must regard the large amount of detailed planning as a necessary part of apprenticeship, doing it cheerfully so that she may the sooner arrive at mastery of an abbreviated form. Time for planning should be most carefully apportioned in the schedule of students doing practice teaching.

The teacher cannot foresee the direction the lesson will take. This, if true, would be all the more reason to have one direction for the lesson well mapped. Good teachers, of course, acquire the ability to adapt their plans to developments during a lesson period, but beginners will need an organization to fall back on if the lesson does take an unforeseen and confusing direction. It will be better to force through a good organization a bit arbitrarily, than to allow the class to become hopelessly muddled and lost. Such confusion prevents the acquisition of the desired outcomes, permits the acquisition of undesirable learnings, kills interest, and may invite disorder. The intellectual consequences of wrecking a lesson through failure to plan are much worse than those resulting from arbitrarily forcing through a predetermined plan. It is granted, of course, and must be emphasized, that we have here a choice between two evils; the desirable thing is ability to adapt the plans to the various lines the lesson may take. That

ability will come only with experience and training in planning. Furthermore, it should be emphasized that an average teacher can, in ordinary learning situations, foresee in general terms and with reasonable accuracy the direction the lesson should take, or at least two or three probable variations of its route. One of the measures of a teacher's competence is her ability to know, in general, what an average group of children is likely to do when confronted with a given real problem, given material, and a given situation.

Questions cannot be planned in advance. This is closely related to the previous point, and is to be answered similarly. It is true that all questions cannot be planned in advance. This is all the more reason to plan carefully those that may be predetermined. They will serve as guides or pivots. Individuals raising this objection rarely think far enough to consider the alternative, which is trusting to inspiration, "hunch," luck, or to such pedagogical gods as one has. The alternative brings out the absurdity of the objection.

Specific pupil answer cannot be predicted. In most training plans the student is asked to indicate, in addition to the general questioning technique, the expected pupil answers, at least to the important questions. It is obvious, of course, that no one can tell exactly what a given pupil will say to a given question. But there are few more efficacious teacher-training devices in existence than that of requiring the teacher to attempt prediction of pupil answers. It is the most direct check that can be devised upon her knowledge of the psychology of the learner, upon the wording and import of her questions.

The amateur teacher usually knows her subject matter, and drives toward desired ends in terms of her own thinking about that subject matter. To teach properly, she must approach the objectives and the subject matter in

terms of the pupil's thinking about it. The plans of beginners and of poor teachers are full of sequences depending upon pupil answers and reactions which never could be secured. Teachers constantly err in assuming that the pupils will answer as the teacher desires, or think as she is thinking of the subject matter. She must acquire the ability to know how the pupil really will answer, as he sees the situation.

One of the commonest errors often committed by teacher-training institutions, is to allow the teacher to describe in general terms what she will do, but not how she will do it. Plans often say, "I will develop a pupil aim," "I will introduce new matter," "I will lead the pupil to draw a conclusion." This is a totally different thing from stating explicitly how it will be done, and still different from actually doing it. The best training device is to require teachers to attempt prediction of actual question and answer procedure.

Those educationists who profess to be afraid of teacher domination advocate quite vigorously that no attempt be made to plan, or more particularly to organize a sequence based upon expected pupil responses. "For," say they, "no one can possibly tell what even a primary child will do with a given question or piece of material." If six-year-old children can outguess the teacher, what will the sixteen-year-olds do? The truth is that expert teachers manifest remarkable ability to predict rather accurately, in general terms, what will happen—and this in lessons quite free from teacher domination. Even if teachers missed their predictions reasonably often, it would still be better to have planned a probable sequence.

Unforeseen difficulties will arise. Again all the more reason to plan so that an orderly sequence can be picked up after the digression is terminated. As a matter of fact, careful, detailed planning, plus experience, will enable

teachers to foresee most "unforeseen difficulties," which are, in truth, usually normal pupil reactions to striking, erroneous or misunderstood material.

The teacher cannot finish her plan. It is usually true that beginners plan far more than they can accomplish. A few err in the opposite direction. Experience will remedy this. The defect is not inherent in planning. Continued planning checked against experience is one of the devices which aids in overcoming the difficulty. Furthermore, summaries can be planned against emergencies of time.

Plans make the teacher dependent. The teacher is bound by the plan, her procedure becomes stilted and formal. This is truly a danger, but it is not inherent in planning; rather it lies with the individual using the plan. Those who are most slavishly dependent upon plans are usually timid and dependent by nature, or are beginners. They do, in fact, override pupils' interests; they pay no attention to questions raised; they do not react to pupil difficulties because they are intent on minutely following their plan. But without a plan on which to depend, they could not proceed at all. Some normal schools, by their procedure, develop this tendency rather than the opposite, which is freedom and adaptability in using the plan. Plans must be used as instruments to free the teacher, to give her confidence based on certainty as to major procedures so that she may handle details and developments independently as the hour proceeds.

A summary viewpoint on planning. The purpose of lesson planning is to coördinate teaching, learning, and material so that desired outcomes are achieved. That kind of planning should be emphasized which leads progressively toward (*a*) a minimum of formal written work, (*b*) freedom and adaptability on the part of the teacher, and (*c*) ability to plan lessons easily and psychologically. As facility is gained, plans will be reduced to a few notes in a

plan book. Elaborate and rigid systems of planning are to be avoided.

The beginning teacher, however, may expect to be asked to write detailed plans. Supervisors and principals are entirely within their rights in asking a mediocre teacher to prepare reasonably detailed outlines, to keep plan books, and to attend conferences on planning. Experienced teachers whose work is eminently satisfactory should not be asked to participate in such procedures.

The essentials in planning. Planning involves one major and two minor procedures. First, the aims and objectives in terms of desired learning results must be determined and stated. With these once clearly defined in the teacher's mind (and too often they are not so defined), the two more immediate procedures can go forward. These are (1) selecting and arranging subject matter, and (2) planning the learning exercises by means of which the subject matter is to be used to achieve the desired outcomes.

Defining the objective. The first item has been stressed again and again throughout this volume. Outcomes must be clearly distinguished. These constitute the aims and objectives. Material and method of attaining objectives can only be selected after the objectives have been defined.

Use of the word "aim." The word "aim" used promiscuously and without further definition is misleading, and is responsible for some of the difficulties experienced in planning and discussing lessons. There are, in the main, three uses of the word: the teacher's general aim; the teacher's specific aim; and the pupil's aim. The first two are statements, in terms of subject matter, of what the teacher is going to do. The pupil's aim is a statement, usually in question or problem form, of what the pupil is going to do. The teacher's specific aim and the pupil's aim are usually statements of the same thing from different points of view.

Subject matter or teacher's aims. There is a hierarchy

of objectives, beginning with the very general and remote, and descending to the immediate and conscious objectives for a given lesson. This hierarchy includes, (*a*) general educational objectives, (*b*) subject objectives, (*c*) grade objectives, (*d*) unit objectives, and (*e*) immediate or conscious teaching aims. These may be illustrated briefly as follows.

General educational objectives include such things as citizenship, worthy use of leisure time, social efficiency, the maintenance of health, etc. These are subjects more for the curriculum maker than for the teacher, though the immediate conscious aims of the teacher must be in agreement with the remote general aims.

Subject objectives indicate the particular contribution of a subject to the general aims of education. For example: [1]

Social science in the junior high school:

1. To interpret the industrial, social, and economic contacts of the junior high-school pupil with his environment
2. To train pupils in the type of thinking most utilized in everyday life
3. To acquire a knowledge of and an appreciation for the social and civic ideals of the American people

The subject objectives may be distributed through the school grades so that the contribution of each level will be distinguished, as: [2]

Arithmetic, Grade 3

1. To automatize completely the processes involved in the mastery of the four fundamental operations
2. To develop ability to use the fundamental processes with facility and accuracy in other than drill exercises

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[1] *Course of Study in Social Science,* Monograph No. 3, Public Schools, Denver, Colorado (1924), p. 9.

[2] *Course of Study in Arithmetic,* Monograph No. 4, Public Schools, Denver, Colorado (1924), p. 54.

3. To establish by practice the habit of checking and proving results
4. To familiarize the child with the mathematical language necessary to interpret simple problems, and to develop skill in the solving of these problems regardless of the process involved

With the unit objective we come much closer to the teacher's work in planning. The special unit objectives should not be mere lists of items, but ends actually sought and attainable. Teachers still vary a great deal in the degree of definiteness with which they state objectives, but there is constant progress toward more and more specific statement.

The teacher's general aims, either for the unit or the smaller definitions of the unit, or the daily lesson were in times past merely statements of the subject to be taught. More commonly it was a statement of the unit of subject matter large enough to occupy some time in covering it. The teacher's specific aim has been a statement of what is to be done in one day, or one lesson. For example:

Teacher's Aim—*General:* To teach the multiplication tables
Specific: To drill on table of 4's

In some cases a topic occupies the class for some time, the specific aim becomes somewhat general and is divided into smaller specifics for each day's work, as in the following:

Teacher's Aim—*General:* To teach the noun
Specific: Properties of the noun [Monday, gender; Tuesday, number; Wednesday, nominative case]

The teacher's specific aim must be stated in *definite, concrete, simple,* and *brief* terms. Although the illustrations above and others similar to them will be found in

lesson plans everywhere and are good traditional practice, the modern conception of teaching—breaking away from the textbook as the chief determinant of ends—insists on a broader statement of teacher aims. The aim is no longer merely to cover a piece of text, nor to study a topic, but to develop in the learner certain understandings, attitudes, abilities, and skills. Interests and ideals are to be formed. These are all teacher aims and should be clearly in the instructor's mind. The aims for a whole unit or project may, of course, be broken down into smaller aims to be accomplished, or at least initiated during part of the process. For example, the following is a partial statement of aims for Unit I of this volume. Pure subject-matter aims are omitted and just enough of the newer objectives is given to illustrate:

TEACHER'S AIM FOR UNIT I—*The Nature of Learning*

The achievement by the pupil of the following understandings:

1. That learning reduced to its lowest terms may be defined as the acquisition of responses
2. That there are various types of responses, various phases of the learning process, such as: (*a*)—(*b*)—, etc.
3. That learning may be defined in various terminologies, but that the central idea is constantly the acquisition of responses by the learner, and changes in his conduct.

Etc., etc., etc.

The achievement by the pupil of the following abilities and skills:

Related directly to teaching, *none.*

Related to the learner's own processes:

1. To attack and aggressively pursue problematic questions
2. To gather data from other sources, weigh them, and relate them to the central problem
3. To organize and express thought in order to answer the questions, and to convince his fellows
4. To participate in group discussions, learning from other students, contributing to the thought of others

Etc., etc., etc.

Another similar illustration:

GENERAL SCIENCE, *Grade Seven, Unit* 1, "The Sun's Gift of Heat."

Outcomes

1. Realization that all life is dependent upon heat
2. Knowledge that heat can be generated, measured, and controlled, but neither created nor destroyed
3. Realization that the sun is the source of all heat
4. Understanding of heat as a factor in every one's life and and in the world's business
5. Working knowledge of the emphasis to be placed upon problems of conservation

Finally, there should be immediate aims for the various lessons or daily exercises. Few things are quite as important as realization on the part of the teacher of exactly what is to be accomplished through the daily lessons. The following are illustrative of these aims: [3]

The aim of this physics lesson is to show some of the practical devices used to determine specific gravity.

The aim of this lesson in history is to bring out the main reasons for the decline and fall of the Roman civilization, and to compare conditions in Rome with similar conditions in America to-day.

The aim of this exercise in chemistry is to give the pupils some familiarity with the method of purifying water of volatile substances by the application of heat, and to afford individuals practice in this method until they can use it practically.

The pupils' aim. In the old Herbartian pedagogy, the *children's* aim was usually stated by the *teacher!* The entire emphasis of the modern point of view is to make central the pupils' purposes. The children's aim must state something the pupils really wish to do and will do

[3] S. S. Colvin, *An Introduction to High School Teaching* (1918), pp. 340-344. By the permission of The Macmillan Company, publishers.

heartily. Kilpatrick has substituted *purposing* for *preparation* to designate the first phase of a learning process, thus emphasizing the pupil-centered as opposing to the teacher-centered aim. Any terminology is satisfactory as long as the pupils' aim is, in fact, the *pupils'* aim.

The correct wording and introduction of the children's aim is one of the most important items in teaching. It cannot be emphasized too strongly that the pupil's aim must be stated from the viewpoint of the learner. It is usually in the form of a question, though a direct statement of what is to be done is often sufficient. Whenever possible there should be a definite statement of aim, but it sometimes happens that a lesson flows smoothly and correctly without such direct statement. This is not wrong but is rarely necessary. Even in these cases, there will be a statement early in the introduction that indicates what is to be done. The principal purpose of the pupils' aim is to set the thought processes or the motor activities of the learner to work in the right direction. It should climax the introduction, preparation, or purposing, whether achieved in a few minutes or in half an hour.

There is less and less tendency to state the aim formally as we progress to the upper levels of the school. High-school and college students are supposed to know what they are doing and why; their aims are in mind in a general way. This is partly due also to the relatively poorer professional training of teachers on the upper levels. It would be better to organize high-school and college teaching so that the definite objectives for lessons and units are specifically stated and understood by teacher and learner.

The skillful teacher on any level will so manipulate the situation as to make the learners ask questions containing the essence of the aim she desires to have them work upon. Under ideal conditions, the class will bring forward many aims, or problems, or purposes for class activity. There

has been much discussion regarding the possibility or impossibility of working upon problems other than those discovered by one's self. Whatever may be the theoretical aspects of this question, it seems absurd to waste time debating the practical aspects. All around us are people working with willingness and interest, achieving real and important results, in tasks and problems discovered and set before the worker by another. A person can be so interested and inspired by another that he will take up important and arduous tasks that by himself he would never have discovered. It is true, of course, that people do work best upon problems they themselves feel to be vital. The practical guidance for the teacher is that she use her utmost skill to bring a realization of the problem to the learner in such way as to make it seem his own. It is not only legitimate, but absolutely necessary under practical conditions, for the teacher to so manipulate the situation that the learners will feel that they discovered the problem themselves. If learners accept whole-heartedly a purpose set before them by the teacher, it is not teacher domination in any true sense. We must not forget, however, that the learner must whole-heartedly accept the aims and purposes of the learning activity.

The children's aim must be *problematic, attractive, concrete, definite, simple,* and *brief.* The following examples show briefly some devices in developing and stating aims. In an upper-grade class soon after the war, an item was read during the current events period regarding the proposed sales tax and revised income tax, together with another item stating the amount of money necessary to pay a soldiers' bonus. The teacher skillfully led a discussion in regard to sources and collection of revenues in which the pupils stated their opinions, usually what they had heard at home. It was evident that they possessed but the vaguest ideas regarding the details of levying and col-

lecting taxes. In addition, there was marked difference of opinion regarding the few facts presented. It was very easy to set up the aim, "Let us see how the government gets its money." This was broken up into a number of smaller units relating to the school district, the town, the county, etc., and served as an aim for the intensive study of taxation in the civics class. Because of the difference of opinion at the start, and because of the teacher's skill in utilizing concrete, everyday material, local problems and sources of information, this somewhat dull topic was attacked with considerable interest. In like manner, the history and development of the local street car company were studied. Later, the geography of Mexico was attacked in an endeavor to answer the question, "Should we try to help Mexico by armed intervention or by education?" In these cases, the pupils were led to differ and thus apparently to discover a problem. It is to be noted that the first statement of the aim as given above does not contain all the necessary elements in a good aim. The smaller aims, however, were made concrete and definite.

Sometimes it is necessary merely to state the aim in order to focus attention at once and beget motive. The mere statement to a lower-grade class, that they are going to write a story or learn to read a piece, or dramatize a well-known rhyme in order to entertain another grade, is usually sufficient. Statements in regard to making sleds, boats, birdhouses, etc., will prove effective with intermediate boys. Advertisements from the daily papers, statements of figures and statistics can be used to motivate drill lessons. A problem already before one class can be utilized in another subject with the same class: "Let us read (name story) to see if it will help us in writing our story about ———."

A very common error in stating aims is to include two thoughts or problems, thus getting what is known as a

double aim. Examples would be, "Let us see what damage the coddling moth does, and if we can eradicate it"; "Let us find out how England oppressed the colonies, and how they won their Freedom"; and "Let us find out how Ponce de Leon searched for the Fountain of Youth and served Spain."

The aims in the following list are not perfect but may be suggestive. They are taken from actual lessons. Some of them cover several days' work, others are for small units covering a day or so; some of them were isolated, while others were parts of a series of lessons. The background for most of them is obvious. They are taken from several subjects and grades and they may be of help in suggesting others in various subjects.

Let us see how the Central States can aid us in winning the war.
Let us see why Russia wants India.
Let us find out why the Missouri Compromise failed.
How did Airlie (Oregon) get its name?
Why did the Southern Pacific Railroad build a line into Marshfield (Oregon)?
Why was the Deschutes Valley a battleground for two great railroads?
Why did England colonize in America?
Let us find out if Roger Williams founded a liberal government in his colony (Rhode Island)?
Why does the Government insist that the soldier's uniform be all wool?
Let us find out how the dandelion seed finds a new home.
We are going to find out how the Eskimo builds his house.
What effects do the pampas lands have on the industries of Argentina?
What did De Soto do for Spain?
Let us see how the colonists received the Stamp Act.
Let us see how the pigweed travels across the country.
Let us see if it would pay McMinnville to buy a supply of good mountain water.

Occasionally there is heard a minor criticism of such aims, to the effect that they cannot be made to cover or

bring to the lesson all the material which would normally belong in the unit. For instance, an aim asking "How Spokane became a trade center," might not seem to admit of discussion of Spokane's public parks, or her commission form of government, though it enables the teacher to bring in most of the important facts about the development of the city. This criticism detracts in no way from the distinct advantages accruing from the use of aims. The material in any lesson that does not easily come under a given aim will be found to be small. Furthermore, it is easy to set up a secondary aim at the end of the series of lessons or main project, in order to bring in those things not already covered, as, for instance, in the case cited, "Let us see how Spokane's present government differs from that of pioneer days."

Organizing units. With the objectives determined, it is possible (1) to select subject or assimilative material, and (2) to devise learning exercises.

A common error has been, and is, to assemble lessons, problems, exercises, text readings, etc.; all good material but without coherence as a whole. The result is chaotic information and muddled thinking on the part of the learner. The traditional instructor teaches her lessons because the course of study or the supervisor indicates the material to be covered. The modern teacher determines what results are to be accomplished, takes the bare outline of material supplied by the course, draws upon such other references as she needs and constructs units, projects, lessons, through which the aims will be accomplished.

What, then, is a unit, and how is it constructed? Strictly speaking, a unit is a significant and comprehensive aspect of the environment. A course may contain a large or small number of units, or may contain but one unit. Sometimes the units must be definitely consecutive because of the apperceptive basis involved. At other times there is no

necessary sequence whatever. The unit is not the same as a chapter, which is an arbitrary grouping of information or subject matter. For the more specific definition of the types of units and their adaptation in various learning situations, the student must await the detail and explicit discussions of special-methods courses. Meanwhile, the following outline indicates the general procedure for planning units.

The organization of a unit. The teaching outline or plan for a unit should set forth in varying degrees of detail the following items:

1. *The objectives.* The teacher will state explicitly the unit learnings or outcomes, that is, the understandings, abilities, skills, ideals, etc., which are to be achieved. Relation to the subject objectives may be indicated if desired.
2. *The assimilative material or subject matter.* The teacher will indicate explicitly the nature and sources of material to be used. If the material is not available in other readily accessible sources but is organized by the teacher for the unit, a brief outline should be given. This is a traditional activity of planning and is largely self-explanatory. An examination of collections of plans or units will make this quite clear.
3. *Instructional materials other than textual matter.* The teacher should list the instructional supplies, materials, visual aids, apparatus, tools, or other "stage properties" necessary.
4. *References.* The teacher should list both the references used by herself in organizing the unit and also those to be used by the pupils.
5. *The teaching procedure.* The teacher will state in some detail how the sections of the unit are to be handled. Depending upon the outcomes desired, she will use any of the learning types, subsidiary learning activities, or general teaching activities as they are necessary. For example, if an understanding or a set of them, is the objective, the technique will be largely that set forth earlier as problem solving, supplemented by supervised study, the organization and expression of thought, the use of books, and perhaps the laboratory, etc. If the objective is an outcome of enjoyment, the technique consists in giving the learner many opportunities for contact with desirable material under favorable con-

ditions, and trying to aid in the development of the proper responses.

The procedure will vary here with the objective, and as stated before, detailed discussions must wait upon special-methods courses. In general, the teacher must indicate in some detail just what she is going to do. In some procedures, the given questions and expected answers should be worked out. The method of pretesting, of introducing new material, of summarizing, providing treatment, assigning, etc., should be worked out in enough detail to give the teacher a confident grasp of what she is going to do.

6. *Diagnostic tests and remedial measures.* The teacher should indicate in general how she will proceed to bring difficulties in learning into the open; how carry on remedial measures for difficulties with the given learning types or material; include perhaps the actual diagnostic tests.

7. *Method of checking or measuring.* The test questions, examinations, or other devices to be used in measuring pupil attainment should be worked out and at least illustrated. Where possible and desirable, levels of attainment will be indicated.

The daily lesson plan. Until comparatively recently, planning revolved around the daily lesson. The daily plans were usually parts of a scheme, but often failed of close articulation. It will be recalled that in discussing the project, distinction was made between the European and American uses of the word *lesson.* A project is a relatively extensive organization of material for teaching purposes. Similarly the unit. But projects and units must be carried on day by day, as schools are now organized, which necessitates daily plans. Furthermore, practice in teacher-training institutions for a long time to come will utilize the daily plan. Hence, we may profitably consider the procedure of daily planning, realizing, of course, that the lessons are not isolated but should be in series.

Many different forms of organization are used in teacher-training schools and in city systems. Some give a minimum of direction, allowing the student to present his procedure as he sees fit. Others provide prepared blanks with definite

space provided for introduction, aim, pivotal questions, summary, etc., and require the student to indicate his procedure in the proper place. Many systems provide for a two-column arrangement, subject matter on one side and method on the other. Still others insist on a somewhat formal division of the teaching period, and hence of the plan, into review, recitation, directed study, assignment, etc. It is probably better to avoid such arbitrary division and to plan the lesson in a more natural manner. The following outline developed through several years of tryout is suggested as a useful scheme. It may be modified to suit individual preferences.

LESSON PLAN OUTLINE

A. *Subject Matter:*

1. *The teacher's aim: general:* general topic being studied
   specific: part involved in this lesson
2. *What is to be taught?* [Give here a list, outline, or brief of the subject matter for the lesson.]
   a. Old knowledge: material already known to pupils, and which will be used in introducing the aim or setting up the problem.
   b. New knowledge: the material to be learned
3. *List sources and references used,* both by teacher in preparation and those to which pupils will be referred. Note tools and material that will be necessary, and which must be ready for the lesson.

B. *Method:*

Write out in some detail your procedure in teaching this lesson. Use the formal lesson steps where they are of help, but disregard them if they interfere. Include both questions you will ask and the answers you expect. Make prominent the pre-test, the introduction of the pupil's aim; show how you expect to provide for possible wrong answers likely to come up; how you will introduce new material, summarize, provide drill, stimulate thought; how you will make the assignment, etc. In short, indicate in this part of the lesson plan what you expect to do and say before the class.

The preceding discussion of the construction of a unit makes unnecessary further explanation of the items included in the daily plan. The procedure is, in general, the same, each within the limits set by the particular problem being solved.

In planning detailed procedure for any given type of teaching, either extensively in the whole unit, or intensively in the more limited daily exercise, the student is guided, of course, by the principles laid down for the various types in Unit III. He will also find the observation outlines of very real assistance here. The items listed in these outlines are designed primarily as guides in the observations of teaching procedure, but serve equally well as guides to proposed procedure, which is the lesson plan. Students may check their planning by asking themselves the questions in the outlines. To be explicit the plan will show, for example, in a problem-solving lesson, whether the teacher has made adequate plans to direct the pupil in defining the problem, gathering data, evaluating that data, etc.

Logical versus psychological. Rousseau pointed out long ago that there are two arrangements of any set of facts or ideas. One chain of thought is developed logically in terms of underlying principles in the material. The other chain of thought is one in which each fact or idea calls up another fact or idea as association, curiosity, and individual interest dictate. The former is the organization of material that has been learned and is already understood by the learner, the latter sequence is the organization of the material as the learner meets it. The former is subject matter organized in terms of itself, the latter is an organization in terms of purposes, desires, likes, and dislikes.

As an example, it seems rather logical to teach the geography of any country in the following order: location as

determined by latitude and longitude and in relation to surrounding countries and waters, the climate—involving prevailing winds and topography—the vegetation and products which depend, in part, on the foregoing items, industries, commerce and trade, transportation, cities, people, and government. But the ordinary youngster would probably be attracted to a study of Holland through pictures of windmills and dikes. Brazil might be entered upon through a discussion of the tremendous amount of coffee consumed in the United States. Most children would have a natural interest in relieving the suffering caused by famines in India. Adams suggests that the study of the feudal system in England and in France would be initiated with the perfectly natural question, "Why are there hedgerows in England and not in France?" To follow rigidly the scheme of organization as outlined, would be to violate not only the laws of the material but the interest and experience of the learner.

History affords a good illustration of the difference between the so-called logical, and the desired psychological organization. History seems to demand, by its very nature, a chronological sequence, but we know that small children have no grasp of long-time intervals, or recognition of the fact that ancient social conditions are out of keeping with present-day conditions. This subject should begin, as it usually does, in a study of the social conditions with which the pupil comes in direct contact. The first step away from home might be, for city children, the study of a farm. This would involve construction on the sand table, stories, pictures, trips if possible, collection of pictures, making booklets, and the like. Indian life, tales of the Vikings, of the shepherds and other early people would further lead the pupil into history as such. A further study of the local community in some detail would then be in order. This will give the class an insight into chronological sequence

through concrete, understandable material. Parker's [4] description of a study of Chicago by a third-grade class should be read carefully by supervisors, for it will be found of great assistance in helping teachers to introduce such work.

Not long ago the subject matter in reading, drawing, and writing was selected and organized in terms of the units or elements of the processes involved, with little regard for the psychological processes of the learner. Children, and adults as well, grasp things as wholes, and analyze later if necessity demands. For that reason, writing and drawing courses based on a mastery of isolated curves and angles violate the learning processes and are even detrimental at times to quick, orderly learning. Writing and drawing should begin with crude efforts, and improvement sought through comparison with better models. Writing scales have been of great value in this situation.

In reading, it is perhaps best to begin with word or sentence wholes, to pick out simple words or groups of words, and from them to work out the phonograms that may be necessary. Such phonic work as is necessary should be based upon sight words that were first learned as wholes.

The shift from formal gymnastics to plays and games is in line with organizing subject matter in terms of the learner interests and activities. The muscular development and hygienic benefits supposed to be derived from gymnastics are much more efficiently obtained through whole-hearted, happy play.

In arithmetic, the tables and combinations are still taught practically everywhere in logical sequence, despite the fact that there is considerable experimental evidence to show that some of them are much more difficult than others that are taught later. Many of those now taught among the

[4] S. C. Parker, *General Methods of Teaching in Elementary Schools* (Ginn & Co., 1919), pp. 137-140.

later ones are in reality easier than those that precede, but few arithmetic primers take these facts into account. The teaching of the fundamental operations must come in for considerable revision in the near future, in terms of experiments on the learning process.

The logical organization of subject matter is that of the adult, the informed person, of the mature mind. It is for the sake of the subject matter itself. Such organization fractionizes and divides the world for the learner. But the child lives in a concrete personal world in which his practical purposes, desires, and emotional reactions are the threads of organization. He is not and should not be concerned with subject matter as such. He uses material from any and all sources as he needs it to carry out a problem or to satisfy some desire. Hence, he attacks and masters subject matter not as it is logically and systematically organized but as it happens to fit his pursuits and purposes. Consequently, the organization of material for teaching should be psychological and not logical. The two parts of a good lesson plan take care of this. The first, or subject-matter side of a plan is a logical statement of material; the second, or method side of a plan sets forth how the material will be taught; thus it is psychological organization. The logical statement or subject matter will, within reasonable limits, stay put, but the psychological arrangement will have to be changed for each group with which it is used. The learner will differ in desires and interests, in background, in various abilities, etc., all of which will affect the psychological organization. The results of the pre-test aid in determining the psychological organization in any given case.

Sample units and daily plans. The present discussions are confined to the general principles involved in planning. Not only does space prohibit the inclusion of illustrative units and plans, but detailed and specific treatment should

be reserved for the special-methods courses or for the supervisors of practice in any given school. However, if it is desired to give some training (and in some schools it must be given in the general-methods course) collections of sample plans are easily accessible. The exercises and references immediately following will care for this matter.

Some objection is raised to using collections of plans and units, because it is said that these exhibits are formal, crystallized, are not real plans. This is a quibble. Such exhibits are valuable and necessary for training purposes. It is true, of course, that teachers should not try to use cut-and-dried plans, developed by some one else for another situation. All teachers, particularly those in training, will have their thinking and planning stimulated through careful analysis and discussion of the plans made for others.

Discussion Questions for Summarizing and Testing on Problem 6

1. Select two or three aims from the list on page 573, or bring in some you have found in other books. Evaluate these aims in terms of the six desirable points listed on page 571.
2. If there is a training school attached to your institution, get some teacher and pupil aims from the lesson plans being used by practice teachers and evaluate them.
3. Read some introductions in these plans and evaluate them.
4. There are now in print many teachers' manuals for reading, history, geography, and science. Find such a manual in the library and search for statements of teacher's and pupil's aims. Evaluate them.
5. Think over the work of some of your own college instructors for the last few days, a week, a month. Is the work organized around aims and objectives, or is it merely "one chapter after another"? Take a specific instance and analyze in some detail.
6. Go over the pre-test questions so far studied in this volume. Pick out three which appeal to you as excellent because of their ability to arouse the learner, and tell why they are good. Select three very poor ones and tell why they do not accomplish the purpose. [Various students are likely to disagree here, some

saying a given question is good, others saying it is poor. Be ready to defend your own interpretation, and also to interpret the differences of opinion.]

7. What are the possibilities and values in attempting to plan a semester or even a year in advance?

8. Take the subject which you are teaching or will probably teach, and write out an organized list of the purposes which you think your subject matter should serve. Do teachers, in your estimation, plan their daily work so as to contribute to the accomplishment of these aims?

9. The instructor may construct a unit or plan with the class, working out details conversationally and encouraging class contributions. This may take a number of class periods.

10. The instructor may critically analyze in some detail a unit or plan, copies of which are accessible to the class. Class questions should be encouraged during the instructor's conversational analysis.

11. The instructor may assign a specific plan or lesson report for critical analysis to individuals or groups, to be reported orally or in writing for class discussion. [A plan in one of the references may be used, or any local collection of plans available.] This exercise should probably be repeated for the various learning types or as often as is needed to give understanding.

12. The class may be asked to construct daily plans or units. It is probably best to begin with small units which are parts of a more extended unit. Larger organizations may be developed gradually.

Parallel Readings for Problem 6

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2. Burton, W. H., *Supervision and the Improvement of Teaching* (D. Appleton & Co., 1922). There is a fifty-page appendix of daily lesson plans.
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